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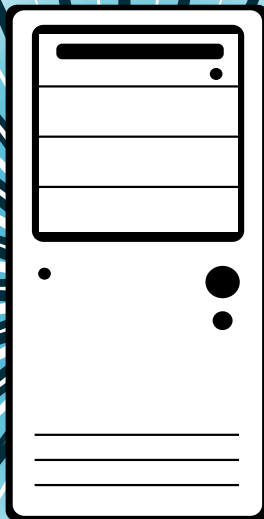
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NOVEMBER

FEATURES

22 35 Amazing Things

Don't limit yourself to playing games and generating spreadsheets. Use your rig to improve your life.

40 Solid-State Drives

Is this speedy storage medium worth the price? We break down the tech and review seven SSDs.

52 BIOS Tweaks

Learn how to dig deep within the BIOS to get the best performance from your rig.

DEPARTMENTS

QuickStart

08 NEWS The ins and outs of H.264 encoding

14 THE LIST The nine most powerful computers of all time

16 DEATHMATCH Stand-alone GPS vs. cellphone-based GPS

R&D

66 WHITE PAPER Finding your way with a GPS

67 AUTOPSY Jabra BT5010 bluetooth headset

68 HOW TO Play games on your Linux rig

In the Lab

79 REVIEWS

90 LAB NOTES

96 RIG OF THE MONTH

LETTERS

18 WATCHDOG

72 DOCTOR

94 COMMENTS

**40**

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BUSINESS

VICE PRESIDENT/PUBLISHING DIRECTOR FOR TECHNOLOGY, PREGNANCY AND CYCLING **Stacey Levy**
650-238-2319, slevey@futureus.com
 GROUP SALES DIRECTOR **Gabe Rogol**
650-238-2409, grogol@futureus.com
 WESTERN ADVERTISING DIRECTOR **Dave Lynn**
949-360-4443, dlynn@futureus.com
 EASTERN ADVERTISING DIRECTOR **Justin Schiller**
646-723-5453, jschiller@futureus.com
 EXECUTIVE DIRECTOR CONSUMER SALES **Jim Schiekofer**
646-723-5410, jschiekofer@futureus.com
 EAST COAST MANAGER CONSUMER SALES **Mark Zenker**
646-723-5476, mzenker@futureus.com
 WEST COAST MANAGER CONSUMER SALES **Nadine Weiss**
310-424-2254, nweiss@futureus.com
 MIDWEST MANAGER CONSUMER SALES **Jodi Sosna**
212-217-1358, jsosna@futureus.com
 MARKETING MANAGER **Kathleen Castailac**
650-238-9218, kcastailac@futureus.com
 ADVERTISING COORDINATOR **Jose Urrutia**
650-238-2498, jurrutia@futureus.com

PRODUCTION

PRODUCTION DIRECTOR **Richie Lesovoy**
 PRODUCTION COORDINATOR **Dan Mallory**
 PRINT ORDER COORDINATOR **Jennifer Lim**

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FUTURE US, INC.

4000 Shoreline Court, Suite 400, South San Francisco, CA 94080
 www.futureus-inc.com

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FUTURE plc

30 Monmouth St., Bath, Avon, BA1 2BW, England
 www.futureplc.com
 Tel +44 1225 442244

NON-EXECUTIVE CHAIRMAN: Roger Parry

CHIEF EXECUTIVE: **Stevie Spring**
 GROUP FINANCE DIRECTOR: **John Bowman**
 Tel +44 1225 442244
 www.futureplc.com

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Sometimes the Best Things in Life Are Free

It's a routine every power user goes through upon building a new rig: installing a host of trusty, must-have applications. I just went through it myself and was surprised by how many of my favorite apps are free or open source. For your edification, I now submit my list—and ask you to ponder whether you're making as much use of free, open-source software as I am.

■ **Firefox 3.** OK, this is a no-brainer. Internet Explorer is usable, and Opera is nice, but Firefox 3 remains my browser of choice. The 3.0 release actually fixed many of the memory issues that plagued the previous version, and the new features significantly upgrade my browsing experience.

www.firefox.com

■ **Filezilla.** I find myself using FTP on a daily basis. Whether it's to exchange files with colleagues outside my office or upload configuration tweaks to the official Maximum PC Team Fortress 2 server, Filezilla fulfills my FTP needs. <http://filezilla-project.org>

■ **VirtualBox.** Sun just purchased this open-source virtual machine project, which makes it easy to build virtual machines for Windows, Linux, or any other OS. Oh, and it also supports the virtualization extensions of modern CPUs. www.virtualbox.org

■ **Handbrake.** I haven't talked about this killer app enough. It makes ripping unencrypted DVDs to H.264 files a snap, and if you pair it with DVD43, you've got a completely free DVD-ripping solution to decrypt and convert DVDs to any format you could want. www.handbrake.fr, www.dvd43.com

■ **OpenOffice.org.** I use Office at work, but I use OpenOffice at home. The few features OpenOffice doesn't support just don't matter enough for me to purchase a Microsoft Office license. www.openoffice.org

■ **WinDirStat.** OK, I don't install this immediately after building a machine, but I install it the moment I run low on disk space. WinDirStat gives me a to-scale map of my drive's contents, usually showing that my hard drive is full of pictures of my dog. www.windirstat.info

■ **Pidgin.** There are definitely prettier multiservice IM clients available—we really wish the Pidgin dev team would add more skinning support to the app—but for speed and reliability, it's tough to beat Pidgin. www.pidgin.im

■ **7-Zip.** Ever need to create a bz2 archive? What about any of the esoteric formats that WinZip doesn't support? That's where 7-Zip comes in. www.7-zip.org.

Got a favorite open-source app that I missed? Email me at will@maximumpc.com. I'll run the best user-submitted tips online later this year.

Will Smith

MUY CALIENTE!

Amazing Things!
page 22

Solid-State Drives
page 40

Game with Linux
page 68



WRITE TO WILL Please send comments, questions, and shepherd's pie to will@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Will is unable to respond personally to all queries.

THE NEWS

The Rise of H.264 Video Encoders

A killer app for the general-purpose GPU, or does this task call for something more specialized? —MICHAEL BROWN

H.264, aka MPEG-4 Part 10, is a video-compression standard that enables high-quality video at very low bitrates (substantially lower than MPEG-2). At the risk of gross over-simplification, the codec compresses video by dividing each frame into a matrix of blocks, analyzing each block, and discarding any redundant information.

Decoding H.264 video is a relatively light task, computationally speaking; in fact, decoding low-resolution H.264 video can be performed on a device as simple as an iPod. Encoding video using H.264, on the other hand, is computationally intense. Nvidia and AMD's ATI division are making the case that their GPUs are just the ticket for H.264 encoding—all that's needed is some clever software.

Industry analyst Jon Peddie agrees—to an extent. "When the GPU is used, it's mostly used for transcoding; e.g., getting from MPEG-2 to H.264. You can do that on a CPU, but it takes a long time; the GPU is about 5 to 10 times faster." Elemental Technologies is working on two software products that will run on Nvidia's CUDA-compatible GeForce architecture: the RapiHD Accelerator for commercial encoding applications (a plugin for Adobe Premiere Pro) and Badaboom, for consumers interested in transcoding video. Although neither product was shipping at press time, Elemental had released a public beta version of Badaboom. "It definitely shows the future," Peddie said of the software. "It's still early in its development, the UI needs work, and there are some additional features they will add, but it's fun to play with."

AMD, meanwhile, is working on its own encoding solutions. "We've been studying how to best merge CPU and GPU processing into a cohesive solution," said AMD spokesperson Jay Marsden. AMD's Accelerated Video Transcoding (AVT) technology will tap the power of the company's new Radeon 4800 series GPUs to transcode 1080p video files to H.264 and



Elemental Technologies' consumer-oriented Badaboom media converter harnesses the power of Nvidia's CUDA-compatible GPUs to transcode video to H.264.

MPEG-2 at 1.8 times real time. The transcoding software will initially be incorporated into Cyberlink's PowerDirector consumer video-editing software. AMD is also working on a professional-quality H.264 encoder that will come in the form of a plugin for Adobe Premiere Pro.

The fabless semiconductor manufacturer Ambric is taking a wholly different approach to H.264 encoding. The company recently developed a reference-design H.264 encoder based on its Am2000 chip, which is a massively parallel processor array (MPPA) consisting of 336 32-bit RISC (reduced instruction set computing) processors. The Am2000 differs from AMD's and Nvidia's GPUs in that it is based on a MIMD (multiple instructions, multiple data) architecture compared to the SIMD (single instruction, multiple data) architecture

current GPUs are based on.

While a SIMD chip can support one or a few instruction streams, each processor in a MIMD chip can be operating on a different instruction stream simultaneously, with each processor able to access a dedicated area of memory. The processors can pass work to one another via a reconfigurable interconnect. But you shouldn't expect to find the Am2000 in a consumer product anytime soon. Pyro AV's new Pyro Kompressor HD, a hardware/software combo that includes a PCI Express card based on Ambric's reference design, sells for \$3,495.

And then there's Intel. Jon Peddie expects the chip giant to compete aggressively in the H.264-encoding space when the company ships Larrabee. "Larrabee doesn't have anything special for encoding," said Peddie "but it can throw a bunch of processors at the problem."

Q & A

Id Software's John Carmack Opens Up

The godfather of frag talks about the future of PC gaming

Q What do you see as the biggest challenge facing PC gaming? Is it piracy?

A Piracy is part of the problem. A lot of it though is just market migration, where a lot of the people who would've bought our previous games, you know, *Quake 2*, *Doom 3*... just prefer to play games on the consoles now. They moved on to those platforms.

It's always hard to say how real the piracy numbers are. We do have lots of cases where the downloads from one piracy site are more than the retail sales numbers for *Quake 4*, and obviously that's just a fraction of the pirated copies, so many times more people are at least trying a pirated version.... It gets really ugly when you think about a cross-platform title where you have console sales. If people who might have bought the console version are pirating on the PC, you start thinking, well, maybe selling a few hundred thousand units on the PC is a good thing, but what did we lose on console sales?

Q With *Rage* and *id Tech 5*, you're writing the engine for DirectX 9-level hardware. Do you think that DirectX 10 and 11 are even necessary?

A They really aren't. The main thing you get in [DirectX 10 and 11] are geometry shaders. There's not a huge [reason to embrace] that, and there's the danger of leaving an API that's reached a good stable level. DX 9 is a nice mature technology. It's the natural evolutionary peak of the old OpenGL model. It's really taken that and [improved it]. It's cleaner and better defined.

Up through DX 9 everybody obviously knew what needed to be in the next version. Now, it's a lot more blind groping around [for new features] that we don't feel a strong pull for. [Those minor features aren't] worth cutting off any of our market. —ws

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WORD WATCH

Bricked

If a device has been rendered completely inoperable as a result of a firmware modification or update, consider it bricked—as it's now about as useful to you as a block of dried clay. Bricking can happen intentionally or unintentionally. For instance, Apple bricked the original iPhone with a firmware update if the device used unsanctioned software or had been unlocked from AT&T's phone service. On the other hand, there have been reports of some PlayStation 3 and Xbox 360 consoles being bricked by official firmware updates for no known reason. —ks



FAST FORWARD



TOM HALFHILL

The Hidden Processor

Intel's coming entry into the discrete-graphics market with a GPU code-named Larrabee seems puzzling at first. Sure, *Maximum PC* readers are avid users of discrete GPUs—many of you cram two or more graphics cards into your powerful systems. But most people (including me) are satisfied with ordinary graphics performance, and even ho-hum integrated graphics.

It seems odd that Intel is spending big bucks to develop its most complex multicore chip for a market that, at best, is relatively flat. Another oddity is that Larrabee's dozens of processor cores are x86 compatible, albeit with wider SSE instructions. Does a 30-year-old CPU architecture make sense for a new GPU?

When *Maximum PC* tests Larrabee against the best GPUs from ATI and Nvidia, I'll be surprised if Larrabee doesn't finish last. I'll also be surprised if it matters. GPUs are only part of Intel's strategy.

One of Intel's motivations is to gain experience with massively parallel processor designs. Massive parallelism is the future of computing, and Intel must catch up with competitors that are years ahead in this technology. It's not as simple as slapping down lots of cores on a chip. The cores must efficiently communicate with each other and share resources. Data must flow into and out of the chip without bottlenecks. Programming tools must be easy to use and capable of efficiently spreading workloads among the cores.

Another motivation for Intel is high-performance computing (HPC). This fast-growing field has an insatiable demand for processing power. HPC is widely used for financial modeling, pharmaceutical development, weather forecasting, genetic engineering, oil exploration, radio astronomy, climate modeling, and more. HPC programmers are using ATI and Nvidia GPUs as number-crunching engines, not as graphics processors.

A third goal for Larrabee is to make GPUs a less-wasted resource in PCs. When you're not playing action games, your GPU is basically a case heater. Already, some products—like Elemental Technologies' Badaboom Media Converter—use GPUs for video transcoding and other compute-intensive tasks. An x86-compatible GPU could make your "hidden" processor easier for programmers to tap.

Add it all up, and Larrabee makes sense. Intel is fundamentally a processor company that doesn't like to see competitors doing more processing.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

VIA Exits Chipset Biz

Is anyone surprised?

VIA announced it has abandoned the core-logic chipset game after years of relative inactivity in that area to concentrate exclusively on making low-power CPUs. VIA chipsets were once a popular alternative to Intel's RDRAM-only chipsets in the Pentium 3 days and helped make the original Athlon a success. But the company says it saw the writing on the wall long ago when Nvidia and ATI entered the chipset market. —**GU**



Judge Halts Defcon Presentation

MIT students were to describe subway vulnerabilities

A group of MIT students were prepared to give a presentation at Defcon on how to hack the Boston subway system, providing details on both physical vulnerabilities related to security lapses as well as how to add value to a subway pass. However, a federal judge issued a restraining order forbidding them from giving the talk after officials with the

Massachusetts Transit Authority filed a complaint.

Although the students were unable to present at Defcon, slides of the talk are readily available on the Internet and had also been burned to CD, copies of which were given to conference attendees. The Electronic Frontier Foundation is currently handling the students' appeal. —**TE**

Maximum PC Folding?

No, the magazine isn't going under—it's sponsoring a Folding@Home team of PC users who are putting their spare CPU cycles to good use. Working in concert, volunteers' machines are able to crunch vast amounts of data to help Stanford researchers unlock the secrets of protein folding—and by extension, help cure common diseases such as Parkinson's. To join Maximum PC's folding team—currently the fourth-largest points producer in the world, with 2,000 active members—download the folding client at <http://folding.stanford.edu> and register with team number 11108. To learn more, visit the MaximumPC.com forum on folding at <http://tinyurl.com/6rqku9>. —**KS**



Nehalem Gets a Name

Intel has dubbed its new Nehalem family of CPUs "Core." The extreme version will be called Core i7. What does the i7 stand for? Nothing, the company says.

That's not the only thing likely to confuse consumers. This is Intel's third trip to the Core well. Prior to the latest chip family, Intel had a Core 2 Duo chip, which itself followed the Core Duo. —**GU**

GAME THEORY



THOMAS MCDONALD

Nothing Like the Real Thing

I am not a doomsayer. I am not here to tell you about the death of PC gaming. I am here to share two names with you: Spore and Europa Universalis: Rome. We'll get to them momentarily.

Every year at this time I create the *Games 100*, an annual guide to the best games released for all platforms since January. To date, 2008 has not been a brilliant year, particularly coming after the high-water mark of 2007. But there have been some strong moments on various platforms, and the fall season promises some excellent releases.

So what about Spore and EU: Rome?

They are the only two significant PC-exclusive titles released this year. I could probably add Age of Conan, but that release is best characterized as a boxed ongoing open public paid beta. Let us not mention it any further.

Much as I've enjoyed spending time with Spore: Creature Creator (and been impressed with what I've seen of the final game), and as good as it is see the Europa Universalis series take on the Roman Empire, this is hardly a list upon which to hang a hobby. We have clearly reached the low-water mark in the history of PC gaming.

Peel back the layers a little bit, however, and you'll find a contrast that matters. Last year, PC gamers got first crack at several excellent multiplayer action games, among them Unreal Tournament III and Enemy Territory: Quake Wars. Their quality did not become completely clear until the games were ported to other platforms this year.

The console versions of both games are weak and flaccid things, pale shadows of their PC incarnations. In graphics, features, speed, and stability, the PC versions are head-and-shoulders above their bastard siblings. Playing an online FPS on a console is like reading the Illustrated Classics version of a great novel. You may get some sense of the actual experience, but it's a long way from the real thing. That real thing is native to the PC, and the true experience simply cannot be duplicated in any other medium. And in that distinction may lie the hope that PC gaming will turn around, and that 2009 will yield more than a couple unique titles.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

USB 3.0 Spec Released

The ubiquitous Universal Serial Bus is headed for a major overhaul. Right before this year's Intel Developer Forum, the USB-IF development committee released a near-completed technical specification for USB 3.0 to its hardware partners. AMD and Nvidia had reportedly been in disputes with Intel due to the company's alleged lack of openness with specs. Expect to see integration of the speedy (now 5Gb/s) interface in consumer devices by the end of 2009. —NC



LEARN MORE AT
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<http://tinyurl.com/usb3spec>

Kiss Your Gear Goodbye

Homeland Security can seize your hardware and keep it indefinitely

In July, the Department of Homeland Security released two policies that, among other things, allow U.S. Customs agents to seize "any device capable of storing information in analog or digital form"—yes, your laptop, cellphone, flash drive, and iPod—for as long as they deem necessary.



Keeping encrypted files on your gear might be enough to get it confiscated.

The policies are designed to allow U.S. agents sufficient time to analyze, translate, or decrypt information crossing a bor-

der in order to detect threats or illegal information.

The problem? Customs agents don't have to give probable cause or even "individualized suspicion," when seizing your assets. Apparently the Fourth Amendment doesn't apply here.

Still, we like the idea of losing our hardware even less than we like the idea of people rooting through our private stuff. What's a geek to do? If possible, leave anything you would miss at home. Encryption's still a good idea, but it could just draw suspicion. Put your sensitive data on a disc and mail it to yourself, or leave it online and download it later. The Internet knows no borders. —NE

INSIDE THE PIRATE MIND

Game developer asks people why they steal games

Cliff Harris, founder of Positech Games, wanted to know what drove people to pirate games. So he asked the public via a blog post why they pirated his games in particular. The post was picked up by Slashdot, Digg, and other sites, and Harris soon found himself inundated with responses. After reading every email, he discovered that a small percentage of people disliked the idea of monetizing intellectual property and a small group admitted to pirating simply because the chance of getting caught was small. For most people, choosing to pirate came down to DRM and the cost of games.

Harris took the information to heart, lowering the price of his games and also removing DRM from the one title that had previously used it. —TE



QUINN NORTON

Ye Olde Copyfight

People are pretty upset about how bad the copyright situation is getting.

Outrageous fines and the occasional jail sentence have everyone down. Even noted copyright lawyer Bill Patry shut down his blog saying, "The current state of copyright law is too depressing." A copyright lawyer!

But I've got good news: Copyright enforcement is a lot nicer these days.

It used to be more... hands on.

Medieval history tells of two saints, Finnian and Columba, with different views on copying. Finnian was more of a collector of one-of-a-kinds who liked them that way, and Columba was more of an information-wants-to-be-free kind of guy.

The trouble began when Columba secretly copied his fellow saint's prized book of psalms. He left with his copy, and when Finnian found out, he got miffed. He complained to the High King Diarmaid. Diarmaid agreed with Finnian, declaring, "As to every cow its calf, so to every book its copy."

This was an especially cute pun at the time since books were made of stretched cowhide.

King Diarmaid demanded the book back and Columba refused. So Diarmaid sent troops to take it, and Columba's clan fought back—3,000 men died, but Columba got to keep his book. He felt pretty bad about it, and to make up for the death toll he accepted exile from Ireland and promised to convert at least that many pagans in Scotland.

But copyright really got rolling 1,000 years later as a Tudor family feud. The Tudors, starting with the infamous Henry VIII of England, really knew how to spat.

Daughter Mary (a Catholic) granted monopolies on printing and copying to keep anyone from saying anything pro-Protestant. Printing without permission, especially Protestant materials, tended to get you imprisoned or killed. When half-sister Elizabeth came home to be queen (and killed Mary), she granted similar copyright, only with pro-Catholic material getting you killed or imprisoned. Mostly killed.

Copyright used to be harsh. So though it may be a bit painful these days, at least we're not embroiled in the BitTorrent Wars... yet.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

The 9 Most Powerful Computers of All Time

9 HOLLY
Powerful enough
for the BBC!

**8 WABAC
Machine**



5 ROADRUNNER
Powerful enough for your
government!

4 DEEP BLUE
Powerful enough to make
us actually watch (part of)
a chess match!

PROTEUS
7 Powerful
enough to
impregnate
Julie Christie!

WOPR
6 Powerful enough
to almost initiate
a global thermo-
nuclear war!

3 HAL
Powerful enough to make
us sit through an inscrutable
movie we still don't
understand!



**2 MASTER CONTROL
PROGRAM**
Powerful enough to inspire
a sequel 26 years after Jeff
Bridges originally escaped
from it!

1



**M5 MULTITRONIC
SYSTEM**

Powerful enough to power the ship
that powered the show that powers
a million geeks!

DEATHMATCH

Stand-alone GPS vs. Cellphone-Based GPS

You're lost. But in this day and age, you aren't going to turn to a map to find your way to your destination—at least, not the kind of map that's folded up in your glove box. You're going to fire up your GPS and have it provide a set of turn-by-turn directions—in the soothing accent of your choice.

But with GPS services now available via both dedicated devices and cellphones, which will you turn to? That's the question we're answering this month as we pit a top-notch dashboard device, TomTom's GO 930 T, against a strong cellular competitor, Verizon's VZ Navigator service. —DAVID MURPHY



STAND-ALONE GPS
TomTom GO 930 T
\$550, www.tomtom.com

ROUND 1

PRICE

Cellphone-based GPS services can vary in price. Apple's iPhone service is free; Verizon's VZ Navigator costs \$10 a month. Yes, there's also the monthly cost of your cellular service, but we're assuming your phone bill is a foregone expense.

With a stand-alone GPS, you buy the product outright and then use it, free of charge, until the global positioning satellites fall from the sky. The TomTom GO 930 T comes in at \$550. If you want the latest map updates each year, expect to shell out approximately \$100 annually.

WINNER: CELLPHONE-BASED GPS

ROUND 2

FLEXIBILITY

Stand-alone GPS units work well in an automobile but tend to have trouble tracking locations from within a more substantial structure—say, a house or even a parking garage. That was the case with the TomTom GO 930 T, which, in our experience, didn't work correctly indoors—a frustrating situation when you're trying to plot a walking route. By contrast, our cellular-based GPS service worked flawlessly. We were able to pull up the exact location of our building with VZ Navigator and receive routing instructions without any problems. It's also a lot more convenient to use phone-based GPS than it is to carry a GPS unit in addition to your cell.

WINNER: CELLPHONE-BASED GPS

ROUND 3

USABILITY

When it comes to road-tripping, we'd much prefer to use a stand-alone GPS than a cellular-based service. Typing in our route (or inputting it verbally) is far easier to do using a large touchpad keyboard than it is using a cellphone's archaic T9 input, or even a full-fledged keyboard. And if you make a wrong turn midroute, a stand-alone GPS system will adjust the directions based on your snafu far faster than a phone-based service. The stand-alone GPS updates so fast it looks like a videogame HUD—complete with lane information and a big, visible display of streets. A cellphone screen just can't provide as much detail.

WINNER: STAND-ALONE GPS

ROUND 5

CUSTOMIZATION

VZ Navigator updates the points of interest in its database on a quarterly basis. Stand-alone units like TomTom's GO 930 T update, well, never—they rely on the maps contained within them. That said, the TomTom GO offers far more options for route and location customization than a typical cellular-based GPS. You can set up itineraries featuring multiple stops based on any points of interest you want, and you can both add to and download other users' saved locations using TomTom's included Home software. Best yet, you can also supply corrections to the included maps if the device tells you something different than what you're looking at.

WINNER: STAND-ALONE GPS



ROUND 4

ADD-ONS

At their core, cellular GPS services like VZ Navigator are just that—services. The only bonus functionality VZ Navigator offers, for example, is movie-time listings and the ability to message waypoints to your friends. By contrast, TomTom's GO 930 T offers a full bundle of features. The device can play music and audiobooks through your Bluetooth device or radio via an internal FM transmitter. You can also connect it to your cellphone and use its data plan to update the TomTom GO 930 T with traffic information, or just route your calls using the device's hands-free speaker option.

WINNER: STAND-ALONE GPS

CELLPHONE-BASED GPS

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Free download, \$10 monthly
www.verizonwireless.com

And the Winner Is...

It's a close call, but a **stand-alone GPS unit**—as epitomized by TomTom's GO 930 T—is simply a better prospect overall than a cellphone-based option. That's not to say there isn't a place for phone-based GPS services or that software like Verizon's VZ Navigator is somehow deficient. Were we to never use an automobile in our travels, we'd definitely see a compelling reason to pick up the software.

However, we're sold on the feature-packed functionality of a stand-alone GPS device. The superior detail and quick-loading

maps are just the foundation. Stand-alone device interfaces are easier to navigate and quicker to access—or speak at—than those of the average cellphone GPS service. Plus the routing instructions a stand-alone device provides are larger, and therefore more legible, and quicker to update, and the devices offer a degree of customization that phone services simply don't have. While you might need to upgrade your jeans to cargo pants, you won't go wrong packing something like TomTom's GO 930 T alongside your cellphone. ☺

Our consumer advocate investigates...

► A Check in the Cracks ► Sneaky Charges ► Fraud Eliminator



Sonic Confusion

I'm a Canadian, and I need help getting my \$731.46 back from the U.S.-based company Sonic Electronix (www.sonicelectronix.com). In January, I ordered some electronics and paid by certified check. I repeatedly checked the site, and my order status always read awaiting payment.

On February 12, I decided to go to the bank and cancel the check. Two days later, I received an email saying my order had been shipped, though my order status still read awaiting payment. I sent an email saying I had canceled the check and no longer wanted the products. The company stopped the package in shipping, and I never received any merchandise.

I went to the bank because I hadn't received my reimbursement after a few days. I was told that canceled checks from the U.S. can take up to four months to return. After four months of waiting, I had the bank investigate and was told that Sonic Electronix had cashed my check and that the bank couldn't recover it.

I sent Sonic an email in June detailing my problem. My email wasn't answered. I phoned a few days later and spoke with someone who said he would investigate. Guess what? I never got an email. I phoned again on Friday, July 11 and spoke to a manager. She told me she would speak to accounting and call me back that same day. After not receiv-

ing the call, I called her again and was told they had figured out the problem and would send me a check in the mail.

Now, I'm aware that mail is slow, but here it is July 31, and I still haven't received a thing. This money was unrightfully taken from me almost seven months ago, and I've spent more than enough money on long-distance calls to California trying to get them to fix their mistake. I no longer want to have to fight for my money. Please help me.

—James Farres Goodfellow

The Dog contacted Los Angeles-based Sonic Electronix and was told by a spokesperson, "There was a misunderstanding. First, the customer had said the check was voided and when that happened we took some measures without verifying it with the bank. Sometime later, the customer called us saying the money was deducted, but the order was canceled, so he wanted a refund. We promised to send him the check. The accounts payable supervisor was going to do it but had some complications and after some time, forgot about it.

The customer never contacted us back to ask where the money was, so we were totally ignorant of the situation until now, when we are getting this complaint.

You may tell the customer that we will send the check by certified mail. A confirmation will be sent by email. We apologize for the inconveniences.



You can't go 10 feet on the Internet without finding complaints about ClassicCloseouts.com

And by no means did we try to take advantage of the situation. It was just an honest mistake that we are willing to amend."

The Dog informed James that the check was, umm, in the mail but also did some sniffing around Sonic Electronix, as well. The scent? Good. At least, according to the Los Angeles chapter of the Better Business Bureau, which gives Sonic Electronix a solid B, which, according to the site, designates "a good rating that still implies reputability. The rating may relate to length of time in business, a past problem that's been corrected, or something else that does not cause problems for consumers. We believe a company with this rating would generally conduct business and respond to any complaints satisfactorily."

About 62 complaints have

been filed regarding Sonic Electronix in the last three years, but the overwhelming majority were settled as either refunds or order fulfillment. Sonic Electronix also gets a clean bill of health from ResellerRatings.com, which shows that in the last six months the company has received a rating of 8.99 out of 10. In ResellerRatings's world, that's pretty good, so more than likely, this is an anomaly.

Classic Burn Job

I would like to warn readers to stay far away from ClassicCloseouts.com. Recently, I had four charges of \$79.99 made to my bank account from the site. A review of my online account showed no purchases. I checked with the wife. Nada. So I went to the website, and lo and behold,

there's no customer service number to call. I found a number via Google, but nobody ever answered. I tried different menu options, but all I could do was leave a message. I left two messages and never got a call back. My wife sent two emails and never got a response. I disputed the charges with my bank, as this was my only reasonable recourse. Has Classic Closeouts sold its last \$5 shirt or what?

—Scott Marlow

The Dog also gave ClassicCloseouts.com a few rings but never reached a human. An Internet search indicates this may not be an isolated event. From Pricegrabber.com to Ripoffreport.com, it seems you can't click a link without stumbling over a complaint about the site.

One person on Complaintsboard.com wrote, "I noticed the \$69.99 charge on my debit card this morning, and I have not ordered from the site since earlier this year.

didn't turn up the names of any officers or registered agents for the company, but the Dog found a 2003 news story in a local paper featuring Daniel Greenberg, who was about to open ClassicCloseouts.com. The website itself is also registered to a Daniel Greenberg of Cederhurst, New York.

The Dog was unable to reach Greenberg for comment, but it's clear that something's not right. The BBB agrees. It gives ClassicCloseouts.com a thumbs-down and has logged no fewer than 224 complaints in the last three years. Of those 224 complaints, the company failed to respond to 213 of them.

Something's Phishy

I purchased FraudEliminator Pro in April 2007. I had a disc failure and lost my registration key. I tried to contact the company numerous times but have not received any response. When I purchased the program, it was from Infini Corp. in Boston, but I cannot locate

So how the hell did you buy the old version of the app?

There are two possible explanations. The first one is most likely. Many older applications get scooped up and packaged for resale by disreputable folks. That's initially what the Dog assumed happened here, but there are some issues that have him confused. While sniffing around for this story, the Dog found a link (http://fraudeliminator.com/aboutus_tech.htm) that took him to FraudEliminator.com. The site appeared to be fully operational with links for downloading the trial version of the software and even the ability to purchase the pro version. However, if you navigated to the root of the website or typed FraudEliminator.com into your browser, it would redirect to McAfee's SiteAdvisor.com.

While SiteAdvisor.com is registered to McAfee.com, FraudEliminator.com is still registered to one of the original creators of the program, Chris Dixon. The Dog contacted Dixon through email for information about what was going on, but Dixon did not respond.

The next day, clicking the links that previously brought us to FraudEliminator.com were suddenly redirecting us to SiteAdvisor.com.

McAfee officials were initially confused about FraudEliminator even being one of its properties and then later told us they were referring the matter to the legal department for clarification.

The Dog, honestly, can't make heads or tails of this. Occam's razor would tell us that you simply purchased a copy of the older free version from a disreputable site that repackaged it, but something else is going on here. Check back next month for an answer to this mystery. Woof. 🐕

"I WAS TOLD THAT CANCELED CHECKS FROM THE U.S. CAN TAKE UP TO FOUR MONTHS TO RETURN."

Like the other guy stated, there is no number to call nor an email address...."

Sound familiar? In fact, many people have reported unauthorized charges on their credit cards from the company, with some stating they had never even shopped at ClassicCloseouts.com. What the hell is going on? As the Dog indicated earlier, he was unable to reach the company for its side of the story, but as of this writing the site is still functioning and taking orders. A search of New York's business licensing department

any software company of that name in the Boston area. At this point, I would say I've hit the wall. Any assistance you can provide in this matter would be greatly appreciated.

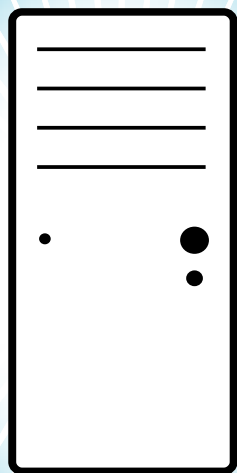
—Gary Snyder

Gary, this one has the Dog and even the software vendors stumped. The product you purchased, FraudEliminator Pro, was one of the earlier toolbars that screened for phishing sites. However, FraudEliminator Pro was turned into SiteAdvisor, which was in turn sold to McAfee in 2006 for \$70 million.



EMAIL THE WATCHDOG If you feel you've gotten a raw deal and need assistance setting a vendor straight, email the Dog at watchdog@maximumpc.com. Please include a detailed explanation of your problem as well as any correspondence you have sent concerning the issue.

I Can Use My Computer FOR THAT?!



Yes, siree! There are some amazing things you can do with your PC that you probably never thought of. Here are 35 of our favorites

BY THE MAXIMUM PC STAFF

As power users, we all know how awesome a PC can be. After all, we've built and fine-tuned our rigs with an eye toward maximum capability. And as a result of our tinkering we know with stone-cold certainty the killer frame rates we can achieve, the mad multitasking we can accomplish, and the sheer speed at which we can get common computing chores done. All very important matters, to be sure. But perhaps it's time to broaden our horizons and look at the lesser-known ways our computers can empower us. Whether it's by helping us develop new talents or ply a new trade or expand our technical savvy, our rigs hold the key to limitless possibilities. Don't believe us? Well, read on.

Play the Most Celebrated Tables in Pinball History

Williams: dead. Gottlieb: dead. Sega: dead. The biggest names in pinball manufacturing have all shut their doors, but their glass and solenoid tables endure in surprisingly true-to-original form, thanks to Visual Pinball and PinMAME computer simulation. Visual Pinball is a table editor/game engine; PinMAME emulates the actual processors and ROM chips that powered the final wave of real-world tables. Once you install both programs, you can rifle through the Internet's generous collection of tables and ROM files for the pinball games that once ate all your quarters.

Getting started is a bit confusing, as this virtual pinball thing is documented in only the most haphazard manner, but once you get your first table a-blingin' and a-blangin', you'll be overcome with joy. Your key starting place for software, tables, and ROMs is www.vpforums.com, which has links to downloads and a vibrant user community. Just remember you'll need four ingredients to actually play: Visual Pinball, PinMAME, table files, and ROM images appropriate to those tables.



Make the Most of Google Alerts

Google Alerts will notify you, via email or RSS feed, whenever a particular search returns new results. You can configure everything from the frequency of the search to the number of terms searched for. You can check out and configure the service at www.google.com/alerts, but we have a few sample uses you can try.

- **Vanity Searches** Want to see who's talking about you online? Set up a search for your name, nickname, or handle to find out why your ears are burning.
- **Follow Your Favorite Team/Celebrity/Topic** A search based on the subjects you're passionate about set to a daily update will send an auto-generated custom newsletter to your mailbox.
- **Add a Search to Your RSS Reader** Once you've created a Google Alert, you can find its unique RSS feed on the results page. Once you have that, you can add it to any RSS reader you use.

Map Your Run or Bike Ride

The computer usually tempts us to stay inside rather than to get some exercise, but Map My Run (www.mapmyrun.com) keeps us motivated. The site allows you to not only create and share maps of your runs and rides but also keep an online training log and list of goals. Skip the \$5/month premium membership, though—you get all the good stuff for free.



Use YouTube as a Resource

It's no secret that YouTube is the place to go to keep current with the latest Internet meme, revel in a celebrity's public disgrace, or kill countless hours of productivity. But the video-sharing site is also a handy source of practical instruction and personal growth. Indeed, amid those millions of minutes-long video clips are complete demonstrations of truly useful tasks. Think peeling and seeding a tomato, playing basic guitar chords, or ironing a dress shirt. We could all



stand to broaden our skills and we're far more likely to master a process if we actually see it performed.

Find Your Celebrity Look-Alike

If you knew you looked like a celebrity, would it make you more confident? Put a little swagger in your step? If that's all it takes, you need to hit up Myheritage.com. The site uses advanced facial recognition technology to tell you which celebrities you most resemble—and to what degree. Just upload a picture of yourself through the site's easy-to-use interface and watch the results pile onto your screen.



Create Your Own Ringtones

The prime directive of ringtone creation? First, do no harm. That means no boy bands, no YouTube no-hit wonders, no German language covers of '80s soft-rock hits for the sake of "irony." If you're going to roll with a custom ringtone, realize that the chance of irritating your coworkers is high if the Jonas Brothers' "Hold On" starts emanating from your handset. How about a little "Mama Said Knock You Out" to signify that dear old ma is on the line? Also possible: "Papa Don't Preach"—Online Editor Norm Chan's signal that Will Smith is calling.

For the iPhone: If you don't want to give Apple your \$2—\$1 to buy a song and \$1 to convert it into a ringtone in iTunes—the simplest, and cheapest, way to make a ringtone is via the audio-editing program GarageBand. Import the song you want to use, select the section of the song you want for your ringtone (it must be less than 40 seconds long), and then select Send Ringtone to iTunes from the Share menu. Unfortunately, the app is Mac only. On the PC, use an audio-editing program such as Audacity (<http://audacity.sourceforge.net>) to select the part of a song you want. Next, export the edited file to iTunes and convert it to AAC. In Windows Explorer, change the file extension from m4a to m4r and then add the file to iTunes again and sync.

For Windows Mobile: Use Audacity to edit your song. Next, use ActiveSync to upload your new ringtone to \Application Data\Sounds.

Solve Very Large Problems

By now, most folks are familiar with Seti@Home and Folding@Home, the distributed computing projects devoted to uncovering extraterrestrial life and the mysteries of protein folding, respectively. But many other large-scale tasks can be tackled using the idle CPU cycles of numerous volunteer computers, such as yours.

- **Predictor@Home** Examines the connection between protein structure and protein sequence in an effort to unravel the human genome (<http://tinyurl.com/6cxbqv>).
- **ClimatePrediction.net** Attempts to forecast climate changes in the 21st century.
- **Evolution@Home** Seeks to answer questions about species extinction (<http://tinyurl.com/6637ze>).
- **MalariaControl.net** Designed to predict the spread of malaria in Africa.



Test Drive a Tattoo

Before you pay big bucks to have an image permanently emblazoned on your bod, doesn't it make sense to try it out first? (Does a lovingly rendered likeness of PIPBoy really suit you?) The solution is simple: Get a sheet of waterslide paper (www.misterart.com) and make a wearable print of the design you have in mind. Using a freeware program like Gimp (www.gimp.org), you can edit your favorite image or create an all-new pattern; then print it on the waterslide paper using a standard inkjet or laser printer. Apply the paper to your skin, dampen it, wait a minute, then peel back the paper. Voila—it just might save you from a lifetime of regret and embarrassment.

Make a PC Lockpick

You forgot your Windows XP password? No problem. With a handy PC lockpick you can crack that OS wide open. To make one, all you need is a PC, an empty 2GB USB key, and an Internet connection.

First, download the USB version of Back Track 3 from <http://remote-exploit.org/>. This Linux-based distro is made for penetration testing of networks and computers, and it's free (although donations are welcome). Extract the contents of the Back Track 3 ISO to a folder on your desktop using WinISO (<http://winiso.com>) or Universal Extractor (<http://legroom.net>).

Next, format the USB key as a FAT32 drive from Windows. Copy the contents of the ISO to the flash key. Now go to Start, then Run, and type `cmd`; go to the flash drive by typing `G:` (or whatever letter was assigned to the drive). Type `CD bootinst`, hit Enter, and then type `bootinst` to start the batch file that creates a bootable master boot record (MBR) on the flash drive.

To try out your lockpick, reboot the machine and either manually change the boot order in the BIOS or use the usual shortcut that most machines have today: hit ESC, F10, or F12 during boot to choose from a list of boot devices. Choose the USB key option. You should see Back Track 3 loading on the screen as you would any OS. You'll then have a choice of multiple versions to run—we've had the most success with the VESA version. (If you're successful getting the key to boot once, but it stops working after a reset, you may have to go back and run `bootinst` again to re-create the MBR). Once you're in Back Track 3, you can pick from numerous penetration methods, but for a simple password change, use `winlockpwn`.

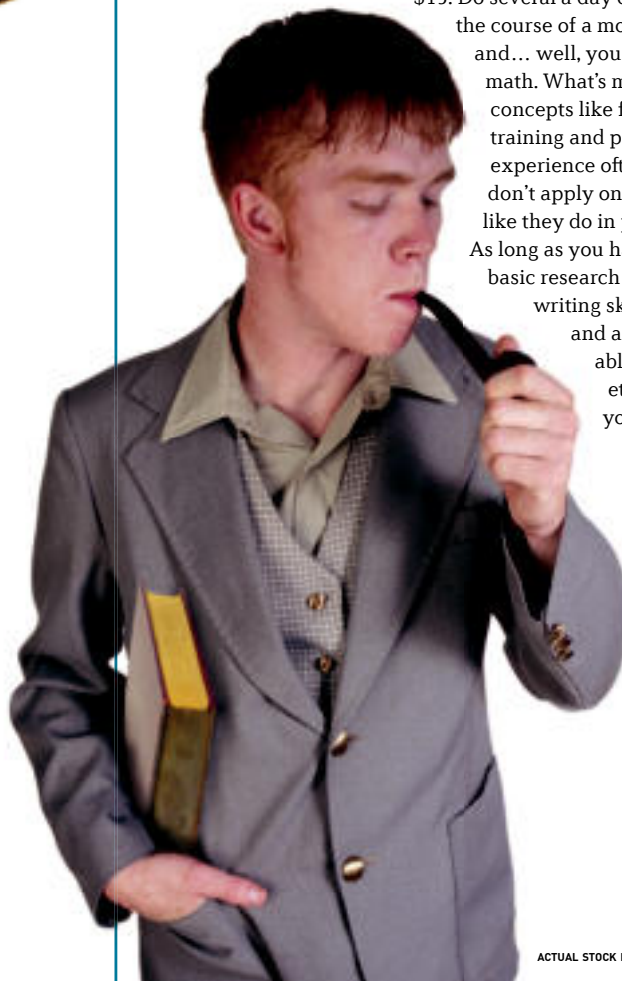
Back Track 3 isn't just a lockpick—it offers a huge assortment of publicly available tools all rolled into one multi-tool for cracking Wi-Fi, spoofing, and sniffing.



Become a Professional Writer

Thanks to the Internet, it's never been easier to get a published byline. Many websites need regularly updated content to stay relevant, and they're willing to pay for it. The going rate for a blog post is \$10 to \$15. Do several a day over

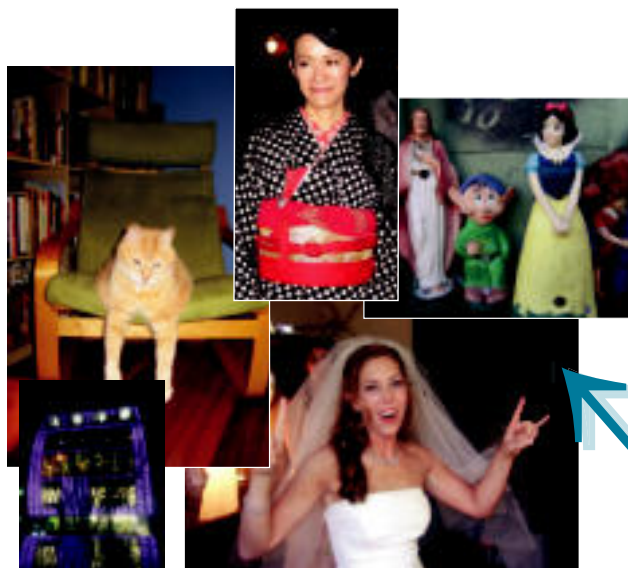
the course of a month and... well, you do the math. What's more, concepts like formal training and previous experience often don't apply online like they do in print. As long as you have basic research and writing skills and a reliable work ethic, you're in.



ACTUAL STOCK PHOTO

Sell Your Photos

Turn your shutterbugging into cold, hard cash by selling your pics online. A number of sites let you upload and sell your images, but we like iStockphoto (www.istockphoto.com) best. After registering and taking a short quiz on copyright law, you'll send in a sample image to see if you have the right stuff. Once accepted, you're free to upload as many images as you want (though the site may decline photos that do not meet its standards). iStockphoto does, however, make explicit what types of photos are needed—increasing your chances of actually making a sale.



Use a Single Keyboard and Mouse with Multiple Computers

You have a laptop and a desktop sitting on your desk. Wouldn't it be great if you could move seamlessly between the two, using your desktop PC's keyboard and mouse for both? It doesn't take a clunky KVM switch to do that. The free Synergy app (<http://synergy2.sourceforge.net>) lets you share not only input devices between two or more machines (even those with different OSes) but also a clipboard, all by harnessing the power of the network.

First, decide which computer's mouse and keyboard you want to use. Download and install Synergy on that PC. That machine will be the server, and the others will be clients. (In our example, we'll assume you have two machines; the server will be a machine named Desktop, and the client will be a machine named Laptop.) In the Synergy app, click the radio button for the "Share this

computer's keyboard and mouse option" and click Configure. Add each computer you want to connect to the top window—to keep things simple, you should configure Synergy with each computer's network name as the screen name. Next, you need to set up the rules for cursor movement. If the secondary PC's screen is to the right of the primary PC's monitor, set a rule that says "0 to 100% of the right of Desktop goes to 0 to 100% of Laptop." You'll also need to set the inverse rule (0 to 100% of the left of Laptop goes to 0 to 100% of Desktop), or your cursor won't be able to move in the other direction.

Now install and launch the Synergy app on your laptop. Select the "Use another computer's shared keyboard and mouse" and enter the hostname for your desktop PC. Press Test and you should be connected!

Design Your Own Papercraft

The art of papercraft—assembling 3D models with paper—is like origami for geeks. It's a lot of fun cutting and folding paper mock-ups of robots and videogame characters from blueprints found online, but it's much more rewarding to craft a model of your own design. It's easier than you think!

Download Google SketchUp (<http://sketchup.google.com>), a free and simple-to-use 3D modeling program. Follow the tutorials on the website to design an elementary 3D object or download samples from Google's 3D warehouse (<http://sketchup.google.com/3dwarehouse>). Save your Sketchup model, and use the program to export it to Google Earth 4 format (.KMZ extension).

Download and install the trial version of Pepakura (<http://tamasoft.co.jp/pepakura-en>

t out the s
lding you



Make Sure You Closed the Front Door

There's nothing worse than the nagging feeling that you forgot to close the front door—or that you left the garage door up, or the lights on, or the water running.... Eaton's Home Heartbeat System (www.homeheartbeat.com) can provide peace of mind by letting you remotely monitor aspects of your home with the use of strategically placed sensors. When something's awry, you're sent an email or text message. The \$200 system includes a wireless base station, an open/closed sensor, and a Home Key for programming the system.



Prank Your Coworkers

- **Skype Conference Call** Press the conference call button on Skype and simultaneously call up to 24 people who sit near you. For best results, ring both office phones and cellphones, and to ensure plausible deniability, remember to call your own phones as well. Use Pamela (www.pamela-systems.com) to play an audio clip when people pick up. We think anything said by Alec Baldwin in *Glengarry Glen Ross* sets the right tone.
- **Autocorrect in Word** On a coworker's computer, open Word 2007, choose Word Options and then Proofing. Click the AutoCorrect button. Next, choose the words you want to be automatically replaced. Try having Word change a coworker's name to "worthless drone" or all articles to "I hate my job." Be creative.
- **Change Keyboard to Dvorak** In XP, go to the Control Panel, select Regional and Language Options, click the Details button on the Languages tab, and choose United States-Dvorak. Soon your coworker will wonder, day yd. d.nn co ircbi rbv

Get a College Education



Take courses from some of the most prestigious universities in the United States—for free. We like to fill our brains via MIT's OpenCourseWare program (<http://tinyurl.com/2t2rfj>). Simply browse through the course offerings and download lecture notes, reading materials, tests, and videos for the classes that interest you. Go ahead and take that course in the thermodynamics of biomolecular systems. Be warned that the university states that OpenCourseWare isn't a replacement for an actual MIT education.

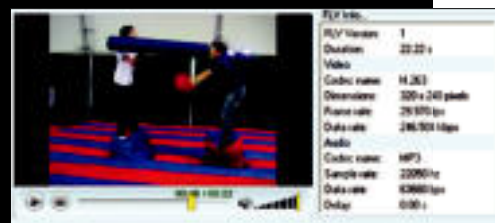
Create an Alternate Reality Game

Imagine playing a computer game that plays back—one that starts intruding on your real life, calling you at home, sending you emails at work... *freaking you out*. That's the appeal of alternate reality games (www.argn.com), a form of interactive storytelling in which the audience becomes a willing participant in the intrigue.

ARGs hinge on an exciting story—say, a stranger who has uncovered a conspiracy and needs help. Map your complete tale into chapters, with puzzles as milestones. Create cryptograms (<http://tinyurl.com/66ejxp>), dabble in steganography (<http://tinyurl.com/4aphq>), or use any of Unfiction's puzzle tools at <http://tinyurl.com/5snq3h> to keep your players interested. Then give your fictional characters full online identities—email addresses, blogs, Facebook and IM accounts—and digitally role-play with your friends. You'll use all those vehicles to tell your tale in small, real-time chunks over about two weeks. For extra intrigue, make first contact via an anonymous remailer (<http://tinyurl.com/5wffqv>). The more intrusive the storytelling, the better—call players from and at pay phones or arrange live online chats at specific times for real-time spookiness. After all, it's just a game, right?

Download and Save Flash Video

With popular video sites such as YouTube and Dailymotion funneling thousands of new videos to the web every day, it can take some serious effort to keep up with them all—not to mention, keep track of your favorites. Make it easier on yourself and download and save the ones you want for future viewing. Use Moyea FLV Downloader (www.flvsoft.com). The app is free and easy to use, and it comes with an FLV player, letting you watch your downloaded videos without going online. Convert your videos to MPG or AVI with the free app Pazera (<http://tinyurl.com/5r2u33>), so you can upload them to your favorite media player.



Find Even Folks Who Don't Want to Be Found

If your idea of finding someone is doing a simple Google search, you'll never get your \$200 a day plus expenses. Even though your best bet is to burn shoe leather, there are certainly better tools a mouse detective can use than a basic search engine. We always begin our searches at Zabasearch.com. Where the data comes from we don't know, but we often don't have to look much further than that site.



Phone listings are another reliable resource. We prefer Anywho.com, but there are a number of other white page directories online as well. The key is to search not only for the person's full name but also just their last name.

Claim Money That's Rightfully Yours

U.S. state treasuries are safeguarding \$32.87 billion that comes from a variety of sources, including lost or forgotten tax rebates, insurance refunds, traveler's checks, and bank accounts. And some of that cash might be yours. To find out if you are in for a payday, go to MissingMoney.com. Enter your name and the site will search a database of 41 states, as well as several Canadian provinces. MissingMoney also links to databases for states that are not yet part of the site.

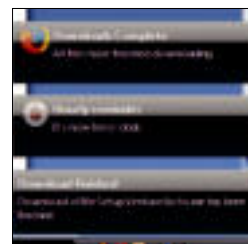


Distribute Your Music Independently

You don't need to sell your soul to get your music into the major digital music stores. TuneCore (www.tunecore.com) makes it possible for you to distribute an album through iTunes, eMusic, Rhapsody, Napster, and other sites with very little hassle and minimal expense. It's the service Trent Reznor is using to distribute his album *Ghosts*. Here's how it works: You pay \$19.98 a year for TuneCore to store your uploaded album, plus a one-time fee of \$.99 per song on the album and \$.99 per store you want your tunes sold through. TuneCore passes along all the money from your music's sales and you retain all the rights.

Keep Your Pop-Up Notifications under One Roof

You finish downloading a file, your computer pops up a little window. Your friend logs online, another message pops up. You're at 20 percent battery life, another pop-up.



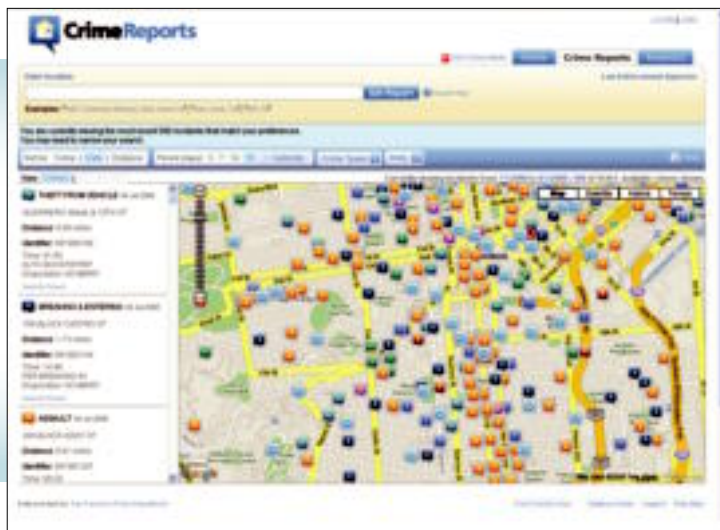
A free application called Snarl (www.fullphat.net) collects all of these notifications and spits them out under a single manageable interface. Plus, there are plugins available that let you add pop-up support for your favorite apps: See what song just loaded in iTunes, what friend just signed on in Pidgin, or what email just arrived in your Thunderbird inbox.

Inventory Your Belongings

The last thing you want to deal with after a devastating fire is wrangling with an insurance company. You can make the process less painful and recoup more of your losses if you have a thorough, up-to-date accounting of all your stuff. Enter the Insurance Information Institute's free Home Inventory software (www.knowyourstuff.org). The app lets you create inventories for all of the rooms in your home. You can include information such as each item's purchase date, serial number, and price, and even a digital picture if you're really meticulous. Then make sure you save a copy of the inventory outside your home!

Find the Creeps in Your Neighborhood

CrimeReports.com lets you check out how safe a neighborhood is before you move in. Type in a zip code or intersection and a map pops up with color-coded icons showing what crimes have occurred over a day-, week-, or month-long period. Familywatchdog.us is a similar site that maps sex offenders by region or name.



Use Your Internet Savvy to Get Rich

Put your hours of web browsing and meme tracking to good use. Entrepreneurial Internet junkies should be able to spot trends just as they're emerging and capitalize on their impending popularity to make some dough. An example: Buy up domains of hot branded properties before they hit the mainstream. If you stumble onto the next Harry Potter or Twilight, take a risk and buy domains related to those brands (e.g., harrypotterthegame.com or harrypottermovie.com). Claiming URLs for unannounced sequels (bioshock3.com) or common typos (microsoft.com) also works. And don't just domain squat idly while waiting to be bought out—fill your site with Google ads to milk page views from unsuspecting visitors. We know a colleague who rakes in a \$1,000 a month just from ads placed on his otherwise unpopulated Grand Theft Auto IV-related domain.

Don't stop at domains, either. With a little more investment, you can turn budding Internet memes into lucrative T-shirt and decal enterprises. The first person to offer *American Idol*-washout William Hung-branded merchandise sold 15,000 shirts in a month.

Find Just the Right Recipe

The first step in making a killer home-cooked meal is having the right recipe. And for that you need look no further than Google Base (<http://tinyurl.com/27hmq1>). The user-generated database is a source of hundreds of thousands of recipes that can be easily searched by keyword, course, ingredient, etc. If your tastes run more along the lines of corporate cuisine, you'll want to dig into Topsecretrecipes.com: Whether you have a hankering for a 7-11 Cherry Slurpee, Girl Scout Thin Mint cookies, or KFC cole slaw, you'll learn how to make it here.



Be Your Own Handyman

Forget about paying a week's wages to have a leaky pipe fixed or a furnace maintained. You can get tutorials on these jobs and a host of other home projects at HGTV.com and DIYNetwork.com. Between the two sites, you can learn everything from basic plumbing techniques to the proper operation of woodworking tools to the steps required for a complete kitchen remodel, often with the aid of video.



Name that Tune

Never again will you have to walk up to your coworker and ask, "What's the name of that song that goes, 'Hmmm, hmm, hmm, hmm, hmmm'?" At Midomi.com you can simply press the Sing or Hum button on the site and then warble into a microphone attached to your computer; your attempt is uploaded and compared to a database of songs, providing artist and title information if it finds a match. If you want to become a star, you can also upload your songs to the site for others to hear.

Get Your Financial House in Order

To get control of your finances, first you need to figure out how much money you bring in each month and where it all goes. While an Excel spreadsheet will get the job done, Mint (www.mint.com) makes the job even easier. By linking all your bank accounts, investments, and liabilities, you can track your spending. Mint will also look at how you spend and save, and suggest ways to make your money go farther. While linking all your financial info to a third-party site might seem scary, Mint doesn't store your password or account information, nor can you transfer funds on the site.

Determine the *Real* Speed of Your Car

Using a data-logging device velcroed to your dashboard, you can quickly learn what your car is capable of: quarter-mile times, lateral Gs, and much, much more. Devices such as the DL1 (\$965, www.race-technology.com), Traqmate (\$700, www.traqmate.com), G-Tech/Pro RR (\$300, www.gtechpro.com), and various cheaper solutions use GPS signals and built-in accelerometers to gather the data, which you later view on your PC via bundled software. (The higher-priced models come with extra features and slightly more accurate technology.)

If you're looking to create movies reminiscent of videogame replays—speedometer readouts, track maps, and all—TrackVision software (\$195, www.trackvision.net) can quickly sync your logged data with in-car footage. Just drive safely, Mario, or take your ride to a real race



track to record its bad-assedness. We also can't help but mention the iPhone app Dynolicious (\$13, <http://dynolicious.com>). The iPhone isn't a PC, but it is a computing platform, and its built-in accelerometer can deliver a rudimentary set of performance metrics for an extremely low price.

Make and Promote a Viral Video on YouTube

Achieving web fame by scoring millions of video views on YouTube is no easy task. You either have to get lucky like Tay Zonday (the “Chocolate Rain” guy) or become a shameless exhibitionist like the Obama Girl. Stack the odds for exposure in your favor by following these best practices for posting.

- **Keep It Short and Simple** If you're a first-time uploader, you're going to have a hard time convincing strangers to watch the 5-minute epic you directed at film school. Casual YouTube viewers are more likely to take a chance with a new video if it's less than 30 seconds long.
- **Lighting and Audio** If you're filming a video blog or confessional, make sure you're illuminated by decent lighting and using a high-quality microphone (i.e., not one built into your webcam). The more professional the presentation, the more people will take you seriously.
- **Use Sex Appeal** Become an attractive female. If that's not an option, hire a few aspiring actresses from Craigslist to star in your clip. It worked for Rocketboom!
- **Optimize Your Title and Tags** Keep your clip's title succinct and provocative and make use of hyperbole to entice curious viewers. Stack your clip with numerous descriptive tags that are loosely related to the content, which search engines rely on to index the video.
- **Use an Eye-Catching Thumbnail** The most compelling factor will be your clip's thumbnail. YouTube extracts the frame at the middle of your footage to use as the thumbnail. Use editing software to splice a sexy image right in the center of your video. Be sure any person appearing in your thumbnail makes eye contact with the camera as well.



- **Share Your Video** Spam your video on message boards and social networking sites like Facebook. Embed your clip in blog posts. “Old-fashioned” promotion may be a lot of work, but if you're lucky, it'll trigger word of mouth.
- **Engage with Viewers** Keep an eye out for comments made on your clip's page, and take the time to respond to both fans and critics. Creating a dialogue with viewers will encourage repeat visitors and make it look like people actually care about your effort.

Get Fit

OK, cream puff, you know you need to drop a few pounds, but you're not sure exactly how to make it happen. FitDay (\$30, www.fitday.com) will come to your rescue. This oh-so-comprehensive app will help you manage your diet and exercise so you can shed those unwanted pounds. All you need to do is enter everything you eat into the program and then tell it how much you exercise, how much weight you want to lose, and when you want to lose it by. FitDay will do the rest... well, except for the exercise.



Make It to Work on Time

We've all experienced it: an epic late-night Civilization game that leaves you too tired to set your alarm clock. If this happens to you—or if you don't actually have an alarm clock—you'll want to check out Kuku Klok (www.kukuklok.com).

This alarm clock works just like any other. You set the time you need to wake up and choose one of four interesting sounds (try Slayer Guitar). Since the clock is one giant flash script, it'll go off even if you lose your Internet connection.



Maximize the Space in Your Home Office

Rarely does a room's arrangement come together perfectly on the first try. You can risk bodily injury lugging your furnishings about, drive yourself nutty meticulously sketching out plans on graph paper, or let your PC do the work using SeeMyDesign.com. This free web app provides sample



floor plans that you can resize, refurnish, and rejigger to your exact specifications. It's so easy you could end up rearranging every room in your house. As an added bonus, the site lets you experiment with different wall paint, trim, and flooring combinations for some serious interior designage.

Find a Place to Sleep—Anywhere!

The premise of CouchSurfing.com is simple: It's a social network that hooks travelers up with a place to sleep. You can use the site to offer visitors to your area a spot on your couch or find free lodging for your own travels. While it's not for everyone, the site offers user reviews of both hosts and guests, and we've heard loads of positive testimonials from couch surfers who've met exciting new people and seen cool new cities, all without being dismembered and buried in some dude's basement. ☺



flash flood

The market is suddenly awash in solid-state drives thanks to the growing abundance and greater reliability of flash memory. Here's what you need to know about today's SSD storage **BY DAVID MURPHY**

Solid-state drives are new to the PC storage front, and they're making waves by offering blistering speeds and greater reliability than traditional hard disk drives. For that, you can thank the NAND flash memory chips that make up every solid-state device.

If you're not familiar with NAND memory, you need only look at your keychain. NAND is the technology that powers the storage on your USB thumb drive... and your mobile devices and the memory card in your digital camera. Whereas your tiny flash card might use but a single NAND chip, SSDs use multiple chips to achieve their higher capacities.

Storage that uses flash memory is quite unlike the hard disk drives used to hold your computer's data. The latter rely on speedy actuators to read and write information on

spinning magnetic platters. SSDs use electrical charges to read and write the state of individual flash memory cells. An SSD's flash memory is nonvolatile: Unlike your computer's RAM, an SSD drive retains your data when you switch the power off. And since the handshake is electric, SSDs can access that data in a fraction of the time it takes a mechanical hard drive to do so.

Sounds ideal, right? Actually, the performance potential of SSDs needs to be weighed against some significant drawbacks. We're going to outline the pros and cons of the technology and how it compares to traditional hard disk storage. We're also going to put seven leading solid state drives to the test and let the benchmark numbers do the talking. At this stage in the storage race, an SSD is a big investment; we want to help you maximize your return.

Breaking It Down

Before you make the move from a hard disk drive to a solid-state solution you need to be aware of what you'll gain and what you'll give up

THE PROS

An SSD's biggest boon is its performance potential. Unlike hard drives, SSDs don't have to wait for a physical arm to move read and write heads to specific points on a spinning magnetic platter. Reading from flash memory is a virtually instantaneous process, giving SSDs the ability to reach faster random read times and greater read throughput than magnetic hard drives.

Another advantage to SSDs is their relatively long life span. The NAND flash memory cells found in SSDs can last for years beyond the three- to five-year life expectancy of a magnetic hard drive. Because hard drives include numerous moving parts, they are vulnerable to wear and tear over time, especially if dropped or jostled.

An SSD can still break if you drop it, but as a whole, the lack of moving parts makes the category less prone to damage. If left unbothered, a solid-state drive can last up to 60 years longer than a hard drive in a similar desktop environment. And as an added bonus, SSDs don't produce any noise and generate very little heat.

THE CONS

NAND flash is still a relatively expensive technology, limiting the capacities of solid-state

drives and making for a high cost per gigabyte. Some manufacturers have managed to lower the cost of SSDs by using multi-level cell (MLC) technology to cram more bits of data onto a single memory cell. The problem is, MLC tech incurs a performance hit over single-layer cell (SLC) technology. The voltage complexities involved in maintaining the multi-bit cells can significantly slow the speed of write operations.

Unless a manufacturer specifies what kind of flash memory powers its drives, you won't know whether you're getting high-performance SLC or low-performance MLC flash. The price tag is the only distinguishing factor outside of benchmarks: MLC drives are among the cheapest SSD drives available (typically half the price of SLC SSDs).

Manufacturers claim SSDs offer better power savings than magnetic storage, but that's not always true. This greatly depends on the construction of the drive: PATA- or SATA-based SSD drives tend to draw more power than typical hard drives.

Finally, SSDs can suffer from inferior random write and sequential write times because the data on an SSD is stored in kilobyte-size blocks. Adding more data to a block is a time-consuming process: The SSD copies the entire contents of the block to RAM, changes the data

in the block, erases the original block of data on the SSD, and writes the changed block back to the SSD.

THE BENCHMARKS

We're using our standard storage benchmarking suite to compare seven solid state drives against two leading hard drives: Western Digital's Velociraptor and Samsung's HD103UJ—the fastest hard drive overall we've tested and the fastest terabyte drive we've tested, respectively. This will let us measure SSD performance against the two extremes of performance and capacity.

Our h2benchw benchmark is a synthetic test that measures a drive's performance over a large swath of read/write operations. PCMark Vantage is our real-world benchmark, as it uses identical application traces to simulate common drive operations caused by normal desktop use. New to our benchmark testing is Adobe Premiere Pro. We use the app to generate an uncompressed AVI file straight onto a drive; the transfer rate of such a large file can tell a lot about a drive's real-world ability to stand up to more demanding tasks.

To see a comparison of all the drives' scores, turn to page 50.

LOOKING AHEAD

What the Future Holds for SSDs

Expect to see upgrades in controllers and NAND flash push SSD prices lower over time, but don't hold your breath for either hard drives or SSDs to ever oust the other from the marketplace. According to Michael Yang, flash product marketing manager for Samsung, NAND flash capacities will continue to grow at a rate of 40 to 50 percent each year. This puts SSD development on par with the 40 percent capacity growth touted by top hard drive manufacturers.

A number of SSD manufacturers currently use PATA-to-SATA bridges in their SSDs, but it's expected that these manufacturers will fully adopt the SATA 3Gb/s standard common to hard drives within 12 months. You can also expect to see performance

upgrades to the actual NAND flash memory inside SSDs: In addition to block-size upgrades and an increase in SSD controller channels, read-ahead and caching algorithms will improve the drives' write performance over the next five years.

Single-layer cell (SLC) and multi-layer cell (MLC) technology will continue to make up the flash cell foundations of solid-state drives. But according to Yang, SSDs will start moving away from the conventional form factors—1.8-inch, 2.5-inch, and 3.5-inch drive sizes—established by the magnetic hard drive market. This could bring forth SSDs of all shapes and sizes, an appealing prospect for notebook vendors that want more internal customization options.

RiData Ultra-S Plus 64GB

Lower cost equals lesser performance

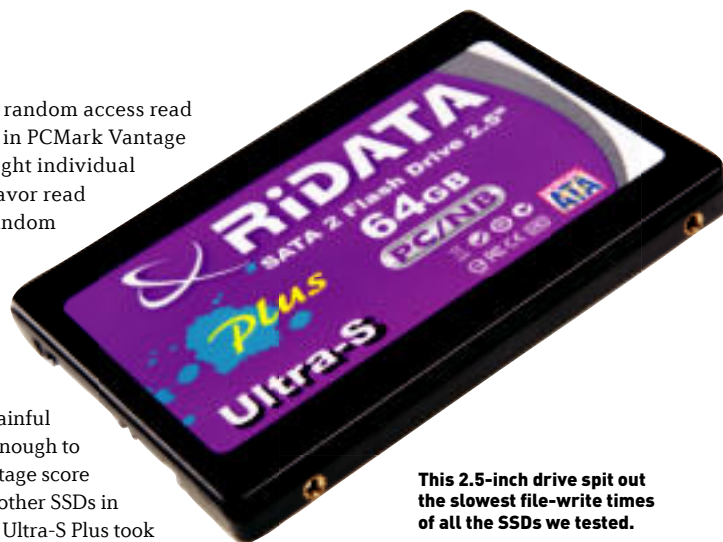
RiData's 64GB SSD uses an MLC design to pack more data onto its flash memory chips. We like how that makes the drive cheaper than the majority of SSDs on the market. What we don't like is how the Ultra-S Plus illustrates the performance losses wrought by using this technology instead of a speedier SLC design.

The Ultra-S Plus was able to overtake the fastest hard drive we've tested—Western Digital's Velociraptor—in two of our benchmarks: a random access read measurement and the overall PCMark Vantage score. Neither win came as a surprise. Because hard disk drives suffer lag while the drive arm moves to the proper location on the disk, flash memory consistently outperforms

magnetic storage in random access read speeds. This helped in PCMark Vantage because the app's eight individual benchmark traces favor read performance and random access reads.

The device's horrible write performance—including an average random access write speed of 248 painful milliseconds—was enough to drag its PCMark Vantage score below that of all the other SSDs in this feature. And the Ultra-S Plus took more than 1.5 times longer to complete our real-world Premiere test than the fastest SSD we tested, Memorex's GT-Series 64GB.

RiData's SSD operates over a SATA 3Gb/s interface, although our initial round of interface speed benchmarks made this drive appear to operate over a bridged PATA connection. We believe that the drive's MLC flash chips threw off our speed tests at first. But the fact that this SSD gave us such poor read speeds over a SATA 3Gb/s interface



This 2.5-inch drive spit out the slowest file-write times of all the SSDs we tested.

doesn't paint a pretty picture for this device. Indeed, you get what you pay for with RiData's SSD—we'd much rather have a \$300 hard disk drive instead of this solid state drive.

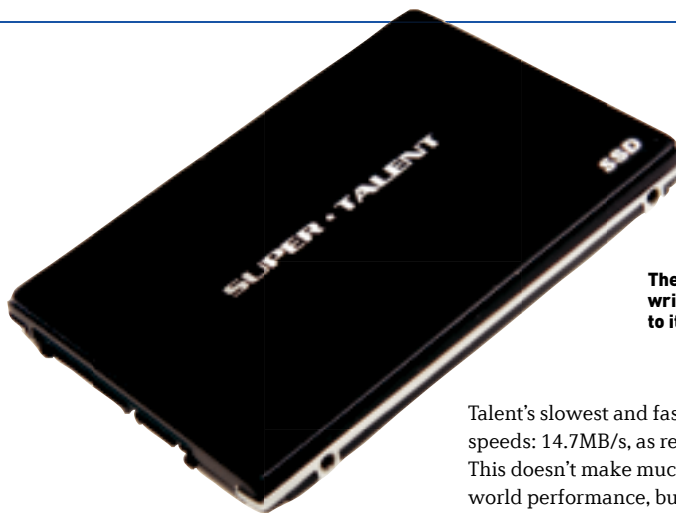
	VERDICT 5
RIDATA ULTRA-S PLUS 64GB \$300 MSRP, www.ritekusa.com	

Super Talent Masterdrive DX

This drive's super talent is slowness

Super Talent's 64GB SSD must be using the exact same hardware as RiData's Ultra-S Plus 64GB. If not, then the similarities between these drives are an amazing coincidence. We recorded identical random access read times for both, an underwhelming .39 milliseconds. Both drives' PCMark Vantage scores were within one-third of one percent of each other, and they varied by just two seconds in our uncompressed AVI file-creation test.

If these two MLC-based drives are indeed brothers in arms, then they're the two drunken soldiers stumbling around at the rear of the SSD brigade. Like the RiData, the Super Talent's performance is unacceptable, even given its low price. While the Super Talent drive overtakes our Western Digital Velociraptor in the real-world PCMark Van-



The Masterdrive DX's write speeds suffer due to its MLC flash chips.

tage test, we'd be terrified to use this drive as the primary storage for our operating system. Its random access read scores are swift, but this drive's random access write performance is atrocious: It was more than 7,000 percent slower than a Velociraptor in our tests!

This drive would rock if we only needed to read information from it, but the SSD's write speeds are simply too slow. There's an inexplicably large gap between the Super

Talent's slowest and fastest sustained read speeds: 14.7MB/s, as recorded by h2benchw. This doesn't make much of a difference in real-world performance, but it's certainly greater than the 2MB/s to 3MB/s difference, at most, that we're used to seeing from SSDs.

Like the Ultra-S Plus, the Super Talent DX's sustained read speeds outpace the theoretical interface speed measurement. But this is clearly indicative of a benchmark snafu, as the Super Talent was unable to fill the pipe of its SATA 3Gb/s connection in our real-world tests.

	VERDICT 4
SUPER TALENT MASTERDRIVE DX \$400 MSRP, www.supertalent.com	

Memoright MR25.2-032/64S GT Series

The name is fitting, as this SSD does little wrong

While Memoright's spec pages attribute this 64GB SSD with a SATA interface, that's not accurate. This isn't a SATA drive, per se; rather, the drive uses a SATA bridge connected to an ATA-133 interface.

Ultimately, however, this doesn't impact the drive's overall speed. Memoright's SSD shoots past the competition in the majority of our benchmarks.

This device outperforms the next-fastest SSD by 14 percent in our average sequential read rate test and 8.5 percent in its average sequential writes. Its random-access read and write scores are the fastest of all the SSDs we've tested. Better still, we were able to write a 40GB uncompressed AVI file to the Memoright SSD in a mere 6:51 (min:sec). That's 1:26 faster than the second-place finisher in that test, the Mtron 7500, and just 28 seconds slower than a Western Digital Velociraptor drive.

We expected a better showing from the Memoright in our PCMark Vantage test, given the SSD's other benchmark masteries. But even though it came in 1.2 percent slower than the fastest SSD in this test, the Memoright's overall domination of our benchmarks makes it the best-performing SSD here. And it had better be when you consider its astronomical price.

VERDICT	8
MEMORIGHT MR25.2-032/64S GT SERIES \$1,520 street, www.memoright.com	



The speedy SLC-based Memoright SSD comes close to filling the pipe of its ATA-133 interface.

Samsung 64GB

For its price, Samsung's SSD delivers punishing performance

Samsung's 2.5-inch SSD packs 64 gigabytes of storage into an above-average package. Granted, the SLC-based drive delivers sustained read transfer rates that are slower than those of nearly all the SSDs reviewed here. But the drive makes up for this inadequacy by posting write speeds that match those of the fastest SLC-based drives in this roundup.

Our real-world experience with the drive followed suit. The Samsung SSD turned in a Premiere time of 8:43, nearly 2 minutes slower than Memoright's GT-series 64GB SSD, but a mere 10 to 20 seconds behind the rest of the non-MLC drives we tested. The Samsung's PCMark Vantage scores were within 4 percent of Memoright's SSD, even though the latter crushes the Samsung by nearly 6 milliseconds in its random access write measurement.

While there are certainly some high points in the Samsung's benchmark scores, the drive's overall performance was just slightly better than average. But given that most other SSDs we've tested offer less than a 10 percent performance improvement yet cost \$500 more than Samsung's SSD, we tip our hat to this drive's excellent cost-to-speed ratio.

VERDICT	7
SAMSUNG 64GB \$790 street, www.samsungssd.com	



Samsung's SSD runs on a strict SATA 3Gb/s interface, unlike some SSDs we've tested.

OCZ SATA II

Samsung's SSD with a twist

OCZ uses rebadged Samsung SSD drives for its SSD storage offerings. While we're confident that OCZ hasn't done any internal tweaking to the drives, it's nevertheless interesting to see that a slight performance difference exists between the twins.

In our tests, the Samsung and OCZ drives ran neck and neck in our sustained transfer read and write benchmarks, but the Samsung edged out the OCZ by 1MB/s to 2MB/s in both scenarios. The two drives posted similar results in random access tests, with the Samsung again taking the upper hand in random access write tests.

We saw a larger difference emerge when we ran our Premiere Pro test. It took 17 additional seconds to write the uncompressed AVI file to the OCZ drive than to the Samsung—a difference of 3 percent. Our PCMark Vantage measurement revealed a larger performance gap. The OCZ drive outpaced the Samsung by 5 percent while handily beating the rest of the field.

The showdown between these drives is really more a battle of price than performance, as the street price for each flip-flops among retailers. While the Samsung SSD offers marginally better overall speeds, we wouldn't pay more for it. We're satisfied with either SSD.

VERDICT	7
OCZ SATA II \$850 MSRP, www.ocztechnology.com	



You would have no idea, based on the manufacturer's specs, that OCZ's SSD is actually Samsung's SSD in disguise.

Mtron SSD Pro 7500

High cost offsets solid performance

Mtron's SSD Pro 7500 is the first 3.5-inch SSD we've tested, and it's a welcome addition to our rig if for no other reason than its size. We don't have to fuss with adapters to attach this SSD to our PC. It's a small thing, but it's a feature we wish more SSD manufacturers would adopt.

Mtron's Pro 7500 exceeded our performance expectations on sustained transfer read rates, putting up a respectable showing that was mere megabytes-per-second behind the second-place SSD, Imation's Pro 7000, and 14 percent behind our speed leader, Memoright's 64GB SSD. The drive delivered write speeds comparable to the other SLC SSDs, capping out at 84.2MB/s. This synthetic performance was reflected in our real-world tests, with the Mtron Pro 7500

plowing through our Premiere Pro test in 8:17—a minute and change behind the Memoright SSD, but second place nonetheless.

The Mtron Pro 7500 didn't perform quite as well as we expected in PCMark Vantage, but it still ran just 2 to 4 percent slower than a majority of the SSDs here. We're confident that the Mtron Pro 7500 would be able to hold its own if you were to use it as a primary drive for your OS.

We were surprised to find Mtron's SSD using a SATA bridge to connect to an internal ATA-133 interface. While it might add slightly to the cost of the drive, we'd be curious to see whether a true SATA 3Gb/s connection could pull even faster speeds out of this above-average SSD.

Its speeds are good, but the biggest problem with Mtron's SSD is that its performance doesn't reflect the \$500 price premium separating this SSD from Samsung's. The Mtron's read rates are just 8 percent faster than those posted by Samsung's SSD, and the dif-



The Mtron Pro 7500 offers excellent speeds, but they're not much better than previous editions of the drive.

ference between the two in our Premiere Pro benchmark is a mere 26 seconds. We love performance, but these meager improvements don't warrant the added cost.

	VERDICT
MTRON SSD PRO 7500 \$1,370 MSRP, www.mtron.net	6

Imation Solid State Drive Pro 7000

Killer read performance for a killer price premium

Like Samsung and OCZ, Imation has partnered with Mtron to use the latter's controller technology in its SSDs. As you might expect, the companies' 64GB drives perform similarly. Still, a few subtle differences exist between the Mtron and Imation SSDs.

Imation's Pro 7000 squeaks out 2MB/s extra in its sustained read transfer rates yet is 0.4MB/s slower than the Mtron Pro 7500 SSD in write speeds. The two drives offer identical performance in their random access read measurements and differ by a scant 0.2 milliseconds in their random access write timings.

After seeing the tiny speed gap in the synthetic tests, we expected the real-world benchmark scores of the Pro 7000 and Pro



Imation's SSD is actually an Mtron Pro 7000: The two companies have united to offer solid-state drives under two separate brands.

7500 to be similar. However, Mtron's Pro 7500 beat out Imation's Pro 7000 by 17 seconds in our real-world file encoding test. By a lesser percentage, the Mtron SSD also beat Imation's device in our PCMark Vantage suite.

It appears that, like the Mtron Pro 7500, the Imation Pro 7000 completely fills the pipe of its ATA-133 interface on its sustained read transfer rates. Although the Imation Pro 7000 is one of the faster SSDs we've tested, we'd be curious to see if a straight-up SATA 3Gb/s version would be able to push past its 99MB/s speed cap. The

drive's write speeds still fall below its interface measurement, so we doubt we'd see much of an improvement there.

Don't let the numbers fool you: Although it appears to be an older drive due to its model number, Imation's Pro 7000 is completely competitive with Mtron's Pro 7500. In fact, their benchmark numbers are close enough that we wouldn't be surprised to find a near-identical underlying hardware were we to crack the drives open and check out their insides. That said, when we compare Imation's Pro 7000 to the SSD market as a whole, we don't find enough of a performance difference to recommend this SSD over less-expensive models.

	VERDICT
IMATION SOLID STATE DRIVE PRO 7000 \$1,300 MSRP, www.imation.com	6

Judging by the Numbers

There's a huge difference between cheap and pricey SSD drives, but the fastest may not be right for everyone!

You might not realize what you're getting when you purchase an SSD. As we've learned from this roundup, the nuances of an SSD's construction can make a huge difference in its performance.

We found that MLC-based drives just aren't worth their low prices. While their read speeds are certainly impressive compared to those of the fastest hard drives we've tested, poor write performance holds them back. We wouldn't use an MLC-based device as the primary volume for our operating system, especially since we can get hard drives that offer faster reads *and* writes at four times the capacity for the same price.

SLC-based drives are a different breed entirely. While their prices can vary from reasonable to outrageous, SLC-based SSDs can deliver a massive performance improvement in general operations thanks to their

lower random access read and write rates. We would definitely recommend a less-expensive SSD, such as those from Samsung or OCZ, for a notebook environment. The combination of price and performance is great, and the added reliability—SSDs are less likely to fail than hard disk drives if you drop your laptop—sweetens the deal.

You don't need this kind of protection in a desktop environment. It's for this reason, and the capacity-to-cost ratio of even the least expensive SLC SSDs, that we cannot recommend this technology for desktops at this time. Or even for a while—we'd tolerate a 128GB SSD in our rig and would be happy with a 256GB product, but it will take a number of successive capacity improvements before such drives reach an acceptable price point.

All of the SLC SSDs we tested blew past

a Velociraptor drive in simulated operating system patterns, as evidenced by the PCMark Vantage scores. But this speedy performance is of little value if Windows plus a game or two completely fills the drive. We'd rather stick with two \$300 Velociraptors in RAID 0 right now: Based on our experience, an array of these drives is only 10 percent slower than the real-world performance of Samsung's \$800 SSD but offers nine times the capacity.

There will come a day when solid-state drive technology is a more compelling desktop option. Maybe NAND flash will get cheaper to produce or larger capacity SSDs will start bumping down prices on the lower-capacity end of the SSD spectrum. We can promise you one thing: Don't expect this turnaround to occur for years. This is only the beginning of the storage war. ☹

BENCHMARKS

	RiData	Super Talent	Memoright	Samsung	OCZ	Imation	Mtron	WD Velociraptor	Samsung HD 103UJ
Average Sustained Transfer Read Rate (MB/s)	91.52	91.57	112.47	87.20	85.60	98.21	96.79	98.31	91.30
Average Sustained Transfer Write Rate (MB/s)	22.69	22.90	106.60	83.56	82.69	83.80	84.24	98.22	89.80
Random Access Read (ms)	0.39	0.39	0.09	0.12	0.13	0.10	0.10	7.24	14.06
Random Access Write (ms)	248.04	246.10	1.46	7.19	7.42	7.85	7.61	3.42	6.41
Premiere Pro (sec)	634	632	411	523	540	514	497	383	WNR
PCMark Vantage Overall Score	9,541	9,577	13,527	13,006	13,691	12,386	12,684	6,082	5,178

Best scores are bolded. Premiere Pro and h2benchw scores were taken using Windows XP SP3; PCMark Vantage scores were taken using Vista SP1. All programs were run on our standard test bed, which uses an EVGA 680i motherboard running an Intel Q6700 CPU, an EVGA 8800 GTX videocard, 2GB of RAM, and a 7,200rpm Western Digital 500GB Caviar Drive. Thanks to DVNation.com for supplying some of the drives in this feature.



OLD TECH, N

Your BIOS may be a decades-old relic of an earlier era, but it can still keep up with the expanded features of today's performance chipsets and motherboards. We'll show you how **BY GORDON MAH UNG**

When man first booted the PC, he saw the BIOS screen: a jumble of monochromatic numbers that made about as much sense as the binary language of load lifters. Sadly, not much about the BIOS has changed since the DeLorean and skinny ties were cool. Decades later, in our modern, visual-based world, we're still greeted with a screen full of text from machines 1,000 times faster than those that were around when the ol' BIOS was born.

Most PC lightweights simply ignore the BIOS and wait for their OSes to take over. Power users, however, know that the BIOS can be a friendly and rewarding place to go spelunking.

So just what the hell is the BIOS? Short for Basic Input Output System, the BIOS is a tiny bit of software embedded in your motherboard that gets executed when your PC is turned on. The BIOS is responsible for chores such as sizing up the amount of available RAM, detecting the hard drives, and setting the CPU speed. Once the system house-cleaning is

multitude of BIOS variants exists. In fact, a Gigabyte board using an Award BIOS can bear little resemblance to an Asus board using an Award BIOS.

In motherboards designed for enthusiasts, board makers typically unmask as many controls as possible. Unfortunately, the dizzying array of options includes both safe and unsafe tweaks. While some tweaks will just leave you with a system that refuses to boot, others can do long-term harm.

So if you feel the least bit uneasy about even changing the boot order of your rig's drives, you may not want to muck around too much in the BIOS. If, however, you're comfortable with the prospect of a little trial and error, it's time you dive in and discover the many secrets your BIOS holds.

How do you get into your BIOS? Reboot the system and then hit DEL, F1, or F2 within a few seconds of the machine POSTing. If your machine has a splash screen that doesn't show anything, try hitting Escape, which should reveal the ugly DOS-looking screen underneath. Only Intel-

done, the BIOS boots the OS from the hard drive and hands over control.

Even though there are only two BIOS makers for consumer desktops today, AMI and Award/Phoenix, a

branded boards still require jumpers to be thrown to access all of the BIOS features. Power down, look for the BIOS Setup Configuration Jumper, set it to 2-3, and power up.

EW TWEAKS



Tweaking Your Memory

The days of just selecting your RAM speed are gone. A modern BIOS exposes enough RAM controls to give even the most seasoned hobbyist a headache. For the die-hard enthusiast though, those knobs and switches also mean something good: control

TIMING IS EVERYTHING

Poke around the BIOS of a budget board or an OEM machine and you'll find it as easy to understand as "The Pet Goat." Heck, even an enthusiast board from three years ago could be understood by most advanced users, as the memory options were as simple as DDR333 or DDR400. Today, we're not even sure that the engineers who write BIOSes fully understand all of the options available. Take, for example, DQS Drive Strength or Process On-die Term B. Huh? Both actually relate to the ability to tweak and tune your RAM to higher frequencies, but for the most part, you can ignore them unless you really want to spend an entire afternoon setting, crashing, and resetting your machine.

Fortunately, the fundamentals are still as valid today as they were a couple of years ago: Column Access Strobe Latency (tCL), Row Access Strobe to Column Access Strobe Delay (tRCD), Row Access Strobe Precharge (tRP), Row Access Strobe Precharge and Precharge Delay (tRAS), and Command Rate or Command Per Clock (CMD). In the BIOS, you're able to tweak

the timing for each of these settings to affect RAM performance.

If you think of RAM as a collection of books in a public library, each timing setting relates to an element of the librarian fulfilling your request for a particular tome. The timing is described in clock cycles, so a lower number equals a faster time.

The tRCD setting, for example, describes how much time the librarian has to get to a certain row on a shelving column. Set it too low, and she can't get to the row where your desired book resides.

Say she reaches the row; the tRAS determines the time the librarian can linger there

finding your book. tRP is how much time the librarian has to get from the row she was at to the bottom of the ladder.

tCL is how much time she has to move between the different shelves of books. Setting it too low would be like asking her to push a 30-foot rolling ladder 100 yards in 2 seconds.

Parameters	Setting	Current Value	How Help
Memory Timing Setting	[Expert]		Press Level: ****
tCL (CAS Latency)	[Auto(5)]	5	Command timing setting (per clock wait)
tRCD	[Auto(5)]	5	
tRP	[Auto(5)]	5	
tRAS	[Auto]	18	
Command Per Clock (CMD)	[1X]	2T	Set Memory timings to Optimal! So use the recommended value
-- Advanced Memory Settings --			
tRRD	[Auto(3)]	3	
tRC	[Auto(22)]	22	
tUR	[Auto(5)]	5	
tWRB	[Auto(3)]	3	
tREF	[Auto]	7.8ns	

F1--Main F2--Exit F3--Load Defaults F4--Save & Exit F5--Reset Defaults F6--Load Optimals F7--Defaults

You often have to set performance RAM manually for it to hit its rated speed and timing.

BEYOND THE BIOS

Exploring the Pre-OS Environment

When the BIOS is finished prepping the hardware, it doesn't necessarily have to hand control over to the OS. Instead, many companies are now inserting a pre-OS, or preboot, environment on their boards that the PC can boot to before the OS. These environments are stored on small bits of flash RAM embedded on the motherboard and can contain a basic Internet browser, Skype client, and even the ability to access your Outlook email and contacts. Although referred to as a pre-OS, the majority of these environments are embedded Linux.

The feature has long been found in notebooks, but it's now migrating to desktop motherboards. Currently, Asus

is the primary adopter of the pre-OS and has it in many of its motherboards. In our experience, it's a novelty that can occasionally be useful—say, for example, you need information from the Internet faster than you can wait for the OS to load. With Asus's ExpressGate pre-OS you can be in a browser in one minute instead of five. Granted, that's a rare need, but we can see a pre-OS browser being useful for, say, downloading utilities, drivers, or fixes to a broken or infected OS on the hard disk—though currently, none of the implementations we've seen allows you to save files to your machine.



tRAS is basically how much time the overall operation takes to climb the ladder, get the book, and get off the ladder.

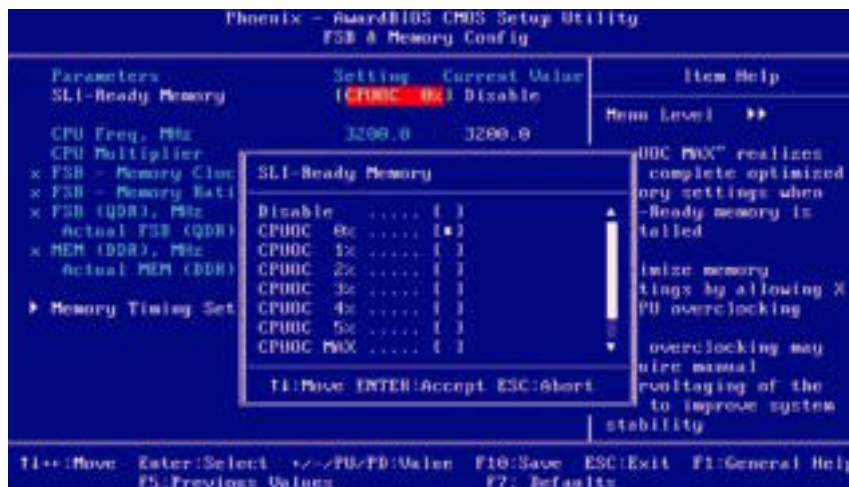
CMD describes the amount of time between one request and the next.

There are two approaches to setting these values: The first is to match them with the timings on your RAM (assuming your RAM provides those settings—commodity RAM doesn't always list specs). If you paid extra for those fancy high-performance modules, you're getting more than just a shiny aluminum heat spreader, you're also getting RAM that's been tested and binned to run at optimal speeds. If you peer at the label of most enthusiast RAM, you'll see timing settings of 5-5-5-15-2T. Translated for your BIOS, that means a tCL of 5, a tRCD of 5, a tRP of 5, a tRAS of 15, and a CMD of 2T. The other method is to let the chipset determine the settings automatically. For example, you could enable SLI memory mode on nForce boards, which would give you optimum settings if the modules support Nvidia's Enhanced Performance Profiles (EPP). Intel has a similar feature call XMP.

There's more to getting your high-performance RAM to run at its rated speed though. The RAM manufacturer specs for timing require the RAM to run at its rated clock speed (see below) and at a certain voltage (see page 62).

WATCHING THE CLOCK

To make sure your RAM is set to the correct clock speed in the BIOS, you'll need to first know your RAM's overall bandwidth rating. If it's expressed as PC3200 or PC6400, you can find out your RAM's clock speed by dividing by eight. So 3200 becomes 400, or 400MHz, and 6400 becomes 800, or 800MHz. Most memory vendors will actually list the module's overall bandwidth—say, PC8500—along with the rated clock speed—1066MHz, in this case. When it comes to manually setting your RAM's clock speed in the BIOS, you'll find the process differs among chipset vendors. On Intel chipsets, where the memory controller is still in the chipset and RAM is tied to the front-side bus, it gets a bit confusing: If you overclock your CPU's front-side bus, your RAM's clock speed will be automatically overclocked along with it. This could cause problems if the RAM's speed is set beyond its rating. (See the North Bridge Strap section on this page to learn how to compensate for this issue.)



Nvidia's SLI Memory (also called EPP and EPP 2.0) as well as Intel's XMP profiles let the BIOS set many of the overclocking modes for you automatically.

With Nvidia's nForce series chipsets, you can actually unlink the FSB from the RAM. This lets you independently set the clock speed for the front-side bus to, say, 1066MHz, and the RAM to 800MHz. The nForce also lets you run the two in linked mode using traditional ratios of 1:1, 5:4, 3:2, and sync. These set the RAM speed based on a ratio related to the speed of the front-side bus. If you're running a 1066MHz FSB CPU and a 1:1 ratio, your RAM would run at 1066. At 5:4, the RAM is 853, and at 3:2 it's 711. Sync would set the RAM at 533. Various vendors pitch linked mode as the best way to set RAM, but we've come to settle on getting the highest reliable front-side bus speed with the RAM speed that works best for you. Remember: Just because your RAM is rated to run at, say, 1100MHz, doesn't guarantee best results at that speed. Since the interaction between memory, chipset, and CPU will greatly depend on what you're doing, there is no one-size-fits-all answer. Get out

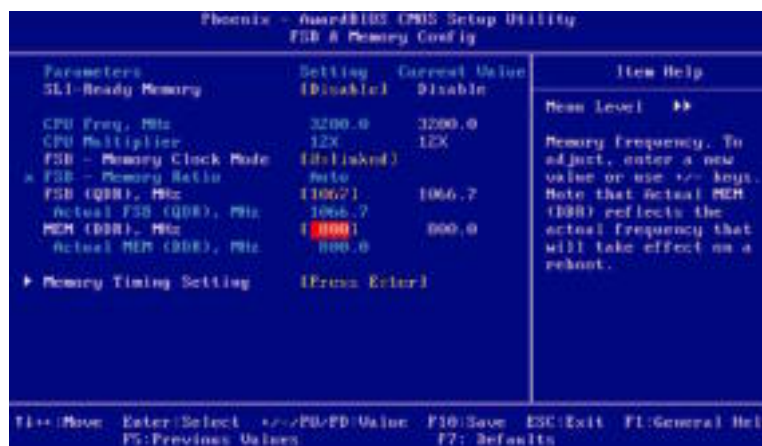
the game or application you use the most and tweak the memory settings until you find the optimal solution.

NORTH BRIDGE STRAP

Fairly new to Intel-chipset boards is a feature known generically as the north bridge strap—Asus calls it the FSB Strap to Northbridge and Gigabyte calls it the System Memory Multiplier—and it can throw us old-timers for a loop. The north bridge is actually its own little processor, which, on Intel chipsets, is tied, or "strapped," to the front-side bus and memory. It's possible to change the speed of the strap—both Asus and Gigabyte, for example, let you manually select strap speeds from 200MHz to 400MHz. There are two practical uses for this. First, by manually setting the speed of the north bridge strap, you can change the memory clock speeds available on the board. As mentioned above, simply increasing the front-side bus speed will automatically increase the speed of

the memory—perhaps far beyond what your module is rated for. By notching the strap down, you can get your RAM operating within spec while leaving the FSB at its overclocked state. Why not just let you pick the RAM speed you want and be done with it? The theory is that the straps are already preconfigured to offer the best performance ratios, which are preferable to those you set on your own.

The second purpose of the strap: The internal clock in the north bridge



By unlocking the FSB from the RAM, you can set the RAM speed and FSB to your liking.



OLDTECH, NEW TWEAKS

will gradually tick up as you increase the front-side bus of your system. It's somewhat similar to the gear ratios in a car. As you rev up the front-side-bus speed, the rpms of the north bridge can get out of spec and cause a crash. The strap will adjust the speed of the north bridge clock independent of the FSB. The general rule of thumb for overclockers is to use the lowest strap available that runs your RAM at the speed you need. This should enable higher front-side bus overclocks.

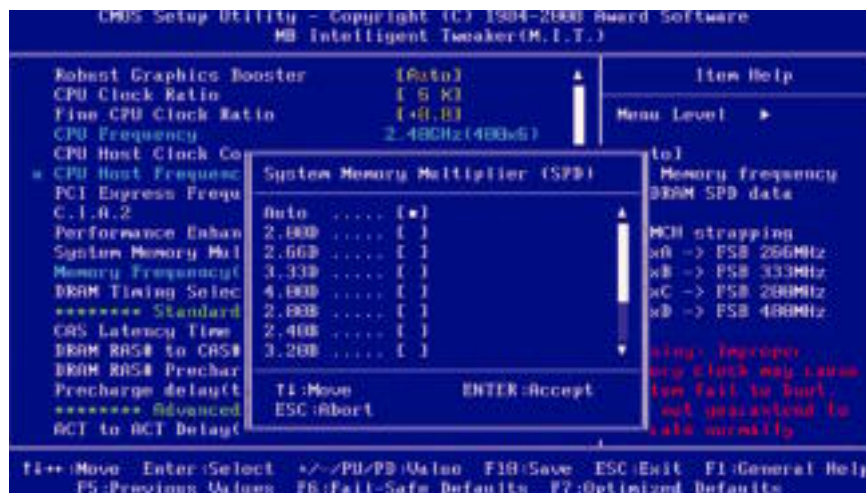
The upshot of this is to run in auto mode if you're not overclocking and leave it to the board engineers. If, however, you are overclocking and seemingly hitting a front-side bus wall that no amount of voltage will address, try lowering the north bridge strap to see if you can push the FSB even higher.

GANGED ACTIVITY

If you're an AMD user and you're confused by all this north bridge strap stuff, you can just ignore it. Since Phenom CPUs feature the memory controller directly in the CPU core, there is no memory controller strap to futz with. What is confusing is the ganged or unganged mode available in Phenom boards. Phenom CPUs feature two separate memory controllers that can be run ganged or unganged. Generally, you'll want to run as unganged to let the controllers operate independently for best performance.

OUT OF THE SKEW

Some motherboards have begun offering the ability to tweak the "clock skew" for RAM. In a nutshell, clock skew is the variation in speed of a module's individual signal paths to the memory controller. Skew is the result of the signal distortion caused by the traces



Selecting a lower strap but the same RAM speed may help you push the front-side bus speed higher during an overclocking session.

in the motherboard, the cleanliness of the power going to the board, and the RAM that's in use. Tweaking the skew settings can help increase stability when you're pushing the chipset and RAM to its limits by overclocking. It's a game of trial and error with skew settings, but if you've got the time and energy, it could help you achieve the few extra megahertz you were hoping to get out of your system—just be ready to roll up your sleeves and run the POST, crash, reset, POST routine. If you're not overclocking, however, you can just ignore these timings.



Tweaking the skew for RAM lets you compensate for the minute signal distortion that occurs with high-speed parallel interfaces.

DON'T DO IT

BIOS Tweaks to Avoid

Just because it's in the BIOS doesn't mean you should touch it. Such is the case with PCI Express overclocking. Notoriously finicky and known to cause crashing, overclocking the PCI Express bus in the hopes of getting more GPU performance rarely ends well. In many cases, overclocking the PCI-E bus by even 1MHz beyond its stock 100MHz can cause instability. Want a really good example? Nvidia made much hay of the Linkboost feature in its 590 SLI and 680i SLI chipsets. Linkboost would automatically overclock the PCI Express slot by up to 25 percent when paired with GeForce cards.

We never could understand the need for Linkboost, as PCI Express bandwidth was so great to begin with. Nvidia must agree now too. The company has removed the feature completely from the newer BIOSes for those motherboards.

You might also be tempted to disable USB legacy support since the feature lets USB keyboards and mice work in DOS mode, and, well, who the hell runs DOS anymore? You do—if you boot into safe mode. With USB legacy support disabled in safe mode, your USB input devices would be rendered useless.



There's more to prepping a rig for a new CPU than just setting the FSB

If you're used to poking around the BIOS, you don't need to be told that the CPU's overall clock speed is determined by multiplying the CPU's clock multiplier by the front-side bus. In other words, the overall clock speed of a CPU with an 8x multiplier and a front-side bus of 400 is 3200MHz.

New CPUs include thermal sensors that slow down the CPU when it overheats. If you'd rather have your machine bluescreen instead of slow down (perhaps for stress testing), you can switch CPU Thermal Control in the BIOS to Off. NForce chipsets actually let you select between lowering the CPU clock speed, or cutting the multiplier and voltage, or both. Since we'd rather lose performance than outright crash, we normally set the BIOS so the clock speeds drop.

One CPU setting that can probably be turned off by most folks is VT, aka Vanderpool or Virtualization support. The setting enables

Our take is to leave it on unless you're specifically having problems with it—on the other

To verify that hardware data execution protection is enabled, go into Windows, hit Start, then Run, and type `CMD`. Enter the command `wmic OS Get DataExecutionPrevention_Available`. The response should be “true.” Or simply download Gibson Research’s SecurAble (www.grc.com/securable.htm), which will scan your machine to verify protection.





Voltage Tweaks

They say no pain, no gain. But it's really no voltage tweaks, no high overlocks. While the risks are great, overvolting can pay some great rewards

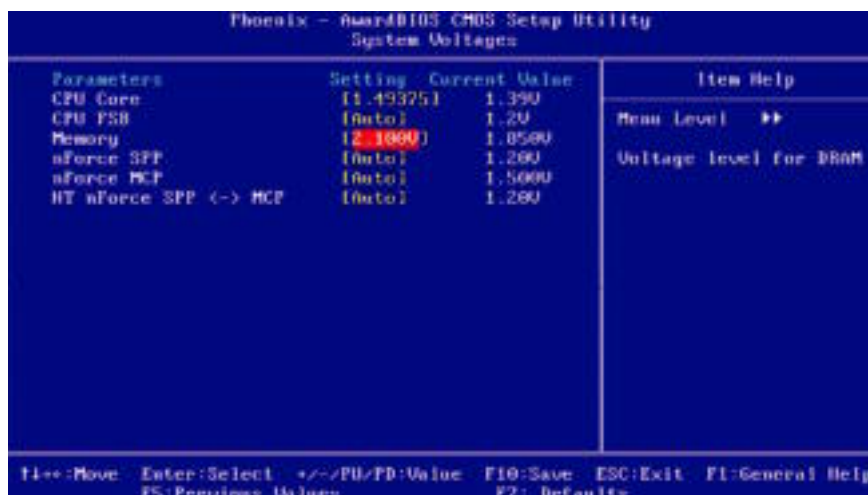
A reader recently asked us whether heat or voltage was more dangerous to a CPU. Hands down, we'd say voltage is far more dangerous. All modern CPUs have a built-in limiter that throttles the CPU if it overheats. The same is not true when a chip receives more voltage than it was designed for. Clearly, this is the most dangerous part of mucking around in the BIOS. If you're faint of heart and don't like to break things, don't mess with voltage tweaks. However, if you're looking for that extra bit of performance, voltage tweaks are often the only way to get there.

Modern motherboards will let you turn all kinds of voltage knobs, but the basics are CPU core voltage, RAM, and chipset.

If you read our sections on memory timing and speed, there's one very important fact you need to know: You'll likely need to overvolt your high-performance RAM modules to hit their rated speeds. DDR400 officially tops out at 400MHz, and DDR2 tops out at 800MHz. Anything higher is technically beyond JEDEC specification and invariably requires overvoltage to hit. In fact, you'll notice that much of the high-performance RAM today will include recommended voltage settings needed to hit the clock speed and timings it boasts.

DDR's spec'd voltage is 2.5 volts. DDR2's is 1.8 volts, and DDR3's is 1.5 volts. To give you an idea of how much additional voltage you need to overclock RAM, consider this: To get a typical DDR2 DIMM to go from DDR2/800 to DDR2/1066, you have to push the voltage to 2.20 volts. To get a DDR3 module to reach all the way to DDR3/1800, you have to push two volts. If you ask us, that's an awful lot of voltage, and your modules probably aren't going to last several years at those levels. On the other hand, what enthusiast is going to run the same RAM for five years anyway?

Which bring us to the age-old question: "How much voltage do I run?"



Most high-performance RAM requires running out-of-spec voltage on the modules.

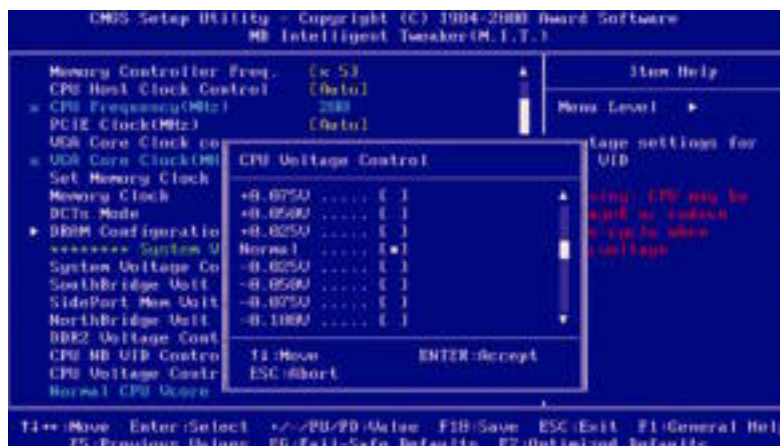
For RAM, we recommend that you follow the manufacturer's settings, as that will be the best indicator of the module's overclocked speed and voltage needs. For CPUs, it's chip dependent. One way to judge how far you can push your chip's voltage is to cruise forums at MaximumPC.com, Anandtech.com, HardOCP.com, or any of the numerous forum boards out there to see what people are running for your particular CPU. One new development we like is the danger gradations in some vendor's newer BIOSes.

Older BIOSes simply let you select how

much additional voltage to add to the CPU without any regard for the risk. Some newer BIOSes will actually indicate by color how hazardous your voltage increase is. Gray is mostly safe while red indicates nuke potential. Since we figure the board engineers are basing their threat levels on lookup tables based on the CPUs themselves, we feel pretty confident cranking up CPU voltage to just below the red zone.

BIOSes today also let you increase voltage to the north bridge and south bridge separately, and in most nForce boards, even

the HyperTransport link between the north bridge and south bridge can be overvolted. Do you really need to do this? We've found that, yes, you do need to goose the north bridge voltage on occasion to get stable upgrades, but like CPU and RAM overvolting, it's quite risky and can damage the board when done without caution. Take our previous advice: See what works for others before jumping in with both feet.



How you change voltage settings will vary greatly from board to board.

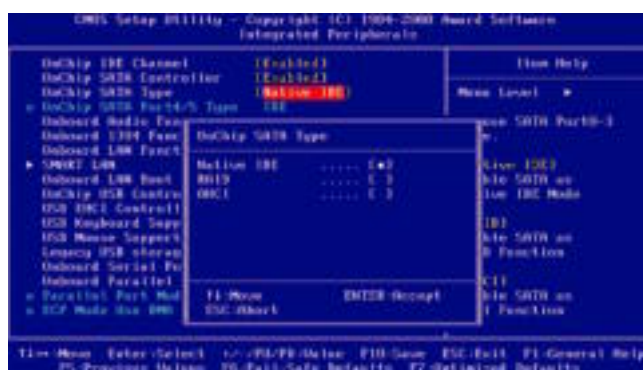


Odds and Ends

Before you POST your new system to install the OS, you should disable unneeded ports and make your decision to run either AHCI or IDE

When we build a new system, one of the first things we do is flip through the BIOS, turning off things we know we won't ever use, such as the serial port and parallel port. If your system doesn't include a floppy drive (some still do), we also flip off the floppy controller in the BIOS. Turning these features off saves some system resources, but it mostly just makes us feel good.

If you dig into your BIOS you'll also see a setting that lets you configure your SATA ports as IDE, RAID, or AHCI. Default should



Turning on AHCI mode will require installing drivers via F6 with Windows XP.

be IDE and most people understand that setting RAID turns on the RAID features of the chipset, but just what is AHCI? It's the Intel specification dubbed Advanced Host Controller Interface that enables such fancy features as native command queuing and hot-plugging of SATA devices. If you leave AHCI off, your drives will run in an emulated IDE mode. The rub is that AHCI is not supported in Windows XP natively. You will have to use a floppy drive and F6 drivers or create a slipstreamed version of XP with AHCI drivers just to install the OS. If you already have Windows XP installed, flipping on AHCI will prevent the OS from loading. It's also not clear what level of AHCI support Vista has, but if you install with AHCI on, you don't need to install drivers. If you install Vista in IDE mode, however, and then turn on AHCI mode in the BIOS, the OS bluescreens.

Do NCQ and hot-plugging make AHCI worthwhile? For the most part, no. NCQ can actually hurt performance in some situations. Still, there have been online reports of chipsets performing quite poorly unless AHCI is enabled. AHCI is supported only by Intel and ATI at this point and not by Nvidia.



MSI has already made UEFI available on a limited set of motherboards.

A NEW WAY

UEFI Promises to Make BIOS Tweaks More User Friendly

The BIOS is older than many of the people who actually use a PC, so why in this age of 3D-accelerated 64-bit operating systems are we still using a line-based interface and 16-bit real-mode BIOS? That's a conundrum the industry is hoping to fix with the Unified Extensible Firmware Interface, which may well replace many of the things the BIOS does today. An obvious advantage of UEFI is that it supports a GUI and mouse controls. UEFI would also be processor agnostic, use higher-level languages such as C++ instead of assembly language, and pretty much make booting your PC more like, well, booting a Mac.

It won't happen overnight, though. Few desktop motherboard vendors beyond MSI have hopped onto UEFI and only the 64-bit flavor of Windows Vista SP1 supports it. Even if UEFI takes off, the BIOS will not totally go away. It'll just get a serious demotion to doing very basic power on self-tests before handing over control to UEFI. The difference is that you may access those familiar controls using a UEFI GUI interface, which will also roll in pre-OS applications as well.

WHITE PAPER

The Global Positioning System

How satellite technology pinpoints your location anywhere on Earth —MICHAEL BROWN

In the immortal words of Buckaroo Bonzai, “Wherever you go, there you are.” But if you want to know precisely where “there” is, you need a GPS device. Let’s examine how this technology operates.

The fundamental idea of a satellite-based navigation system was conceived prior to World War II, but no one pursued the idea aggressively until the Russians launched Sputnik, the first artificial satellite. Research continued through the 1960s, and the U.S. Department of Defense settled on the first design in 1973.

The first developmental GPS satellite—Navstar 1—was launched in 1978, the first fully operational GPS satellite was put into orbit in 1989, and the system was declared fully operational in 1995. Although GPS remains an indispensable military tool (and is maintained by the U.S. Department of Defense), the technology was made available to

consumers in the 1980s and can now be found in relatively inexpensive devices ranging from cellphones and PDAs to dedicated handheld GPS receivers.

THE INFRASTRUCTURE

The Global Positioning System consists of three segments: a network of satellites (24 in the original system, 31 today) orbiting 12,600 miles above Earth (the space segment), a series of ground stations (the control segment), and individual GPS receivers (the user segment). The satellites are positioned in space so that a GPS receiver anywhere in the world can receive signals from at least four simultaneously (i.e., at least four satellites are above the horizon at any point on the planet). We’ll

explain the importance of having access to four satellites at the same time shortly.

Each satellite transmits two coded radio signals, designated L1 and L2, to Earth. The L1 signal operates at a frequency of 1,575.42MHz, and the L2 signal operates at 1,227.60MHz. These signals are of low power (between 20 and 50 watts each), and they travel by line of sight, which means they can pass through

EACH SATELLITE’S FLIGHT PATH IS MONITORED BY A NETWORK OF SIX U.S. AIR FORCE STATIONS LOCATED AROUND THE WORLD.

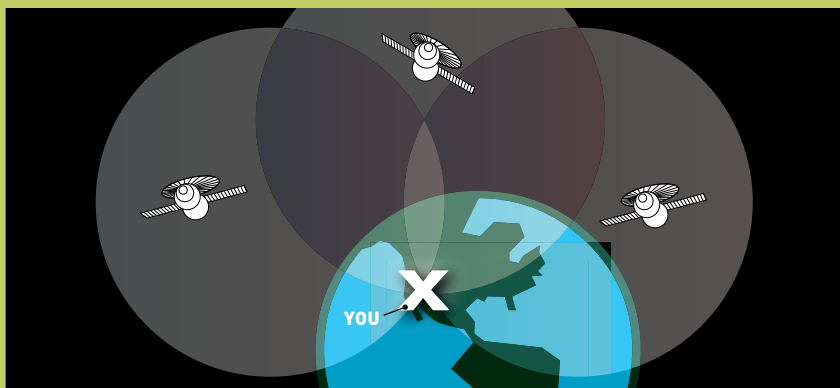
clouds, glass, or plastic on their way to a receiver, but they’re obstructed by more solid objects, such as buildings and mountains.

The L1 signal contains two pieces of information: a coarse-acquisition code (a pseudo-random number that identifies a particular satellite) and a navigation message. A pseudo-random number exhibits all the properties of a random sequence, but it’s actually generated by a complex algorithm and can therefore be repeated. The L2 signal contains an encrypted precision code that can be decrypted only by military-grade GPS receivers. The navigation message in the L1 signal contains the date and time the signal originated, information related to the satellite’s status and health, ephemeris data (the satellite’s precise location at a given time, which the receiver uses to calculate the satellite’s exact position based on the speed at which the satellite is traveling and the current time), and almanac data (coarse orbital parameters for all the satellites in the constellation).

Ephemeris data is highly detailed and is considered valid for only four hours after receipt; almanac data is more general and remains valid for 180 days after being downloaded to the receiver. The receiver uses almanac data to determine which satellites it should search for, based on the current time and their last known position (as reported in the almanac).

HOW IT WORKS

Using a GPS to Pinpoint Your Location



If the GPS receiver calculates that it is 13,000 miles from a satellite, it knows that it is located somewhere on an imaginary sphere with a radius of 13,000 miles. The receiver is at the outer edge of this sphere, and the receiver is at the center of this sphere. The receiver then measures its distance from the other two satellites and generates two more imaginary spheres. The receiver will be located at the precise point at which all three spheres intersect. A GPS receiver able to communicate with a fourth satellite can determine your current altitude.

Each satellite's flight path is monitored by a network of six U.S. Air Force stations located around the world, which record any deviations in the satellites' orbits (slight changes are usually caused by the pull of the moon and the sun). Each station forwards the information it receives from the satellites to a master control station located in Colorado Springs. The master control station synchronizes the atomic clocks carried on each satellite and uploads any orbit changes, which are in turn sent to GPS receivers as part of the satellites' signals.

If a GPS satellite's orbit ever needs to be adjusted (or if the satellite is otherwise determined to be unreliable), the master controller labels it as "unhealthy," so GPS receivers won't use it in their calculations. Once the problem has been resolved (following an orbit correction, for example), the master controller uploads the satellite's new ephemeris data and tags it as healthy again.

WHERE AM I?

In order to calculate its position, a GPS receiver compares the time the satellites' signals arrive to the time at which the satellites initiated their transmissions. It then multiplies these differences by the speed of light to determine the distance that each signal has traveled.

Considering the great distances involved, making a precise calculation requires that the clocks on the GPS receiver and each of the satellites be synchronized to the nanosecond, which typically can be achieved only with costly atomic clocks. It's not feasible to put an atomic clock in a consumer GPS receiver, but there is a clever solution: Since the master control station synchronizes the atomic clocks on all the satellites, the receiver constantly resets its inexpensive quartz clock to match the time that the satellites are reporting.

The receiver uses trilateration to determine its location on a 2D plane. Trilateration is similar to triangulation, but where the latter method uses angle measurements and at least one known reference point to determine the coordinates of a specific location, the former uses the known locations of three reference points and the calculated distance between the object and those known reference points (see diagram). Using a fourth satellite enables the GPS receiver to determine its current altitude.

Once the receiver has determined its exact position on Earth, it translates this information into latitude and longitude and plugs that data into a map file stored in its memory. 📍

Jabra BT5010 Bluetooth Headset

Ever wanted to rip one of these headsets out of an annoying chatterer's ear and smash it into the ground? We did just that... to show you what's inside!

MICROPHONE

Underneath the BT5010's sliding front panel is a 4mm microphone. It's omnidirectional, meaning it can pick up sound from any direction. A unidirectional microphone requires you to speak directly into its center for your voice to be picked up.

BATTERY

The BT5010's circuit board features an on/off button on its underside, but you're unlikely to use it, as the headset's rechargeable lithium-ion polymer battery boasts 12.5 days of standby time.

PROCESSOR

CSR's Bluecore single-chip microcontroller is the brains of the BT5010. It hosts anywhere from 4 to 6 megabits of included read-only memory. Depending on the specific chipset, it can also feature an integrated FM tuner and GPS receiver.

VIBRATOR

This spinning device warns your ear that a call is incoming. That is its sole purpose—keeping others from knowing when your friends hit up your digits.

SPEAKER

The BT5010's speaker attaches to its enclosure here. Inside, a tiny electromagnet wrapped in coils is surrounded by a larger magnet. When electric current passes into the coils, the smaller magnet quickly bounces up and down, creating sound waves.



SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO Run Windows Games on Linux

Tired of the lackluster gaming opportunities on your alternative OS?

Playing your favorite PC titles in Linux is easier than you think! —JEAN-PAUL CONNOCK



TIME = 37 MIN



WHAT YOU NEED

■ **A GNU/LINUX INSTALLATION WITH RECENT KERNEL (2.6x)**

Free, www.ubuntu.com

■ **WINE** Free, installed via Linux or winehq.org

■ **A PC GAME**



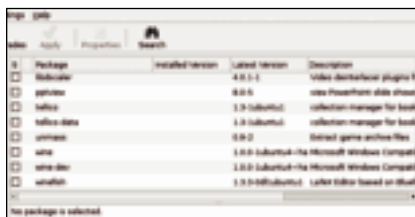
It's OK, Linux users. We understand your pain. Gaming on your open-source platform is, for the most part, restricted to similarly open-source or freeware titles from independent developers. You don't often receive the same love that Windows users enjoy from triple-A game developers. But your time spent in the dark can now end: We're going to show you how to play the latest PC-only titles on your Linux distribution of choice.

We're using a program called Wine to simplify the process of running Windows-based games on a Linux platform. Unlike virtualization applications such as VMware, Wine is not an emulator. An emulator is a wrapper that allows one operating system to run within another. This wrapper hides the primary OS from its windowed love child, creating a software bubble for the second OS to play in. Since emulators run a complete OS within this virtualized bubble, the performance hit can be staggering and hinders gaming on all but the most powerful PCs.

Wine avoids this problem by implementing a set of routines (or APIs) used by applications to communicate with Windows. Rather than emulate them, Wine uses a compatibility layer that translates system calls from Windows to Linux and vice versa. If you're still confused, relax. You don't need to understand how it works. You just need to know that Wine is free and easy to configure and will have you up and gaming in no time!



SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.



INSTALL WINE THE EASY WAY

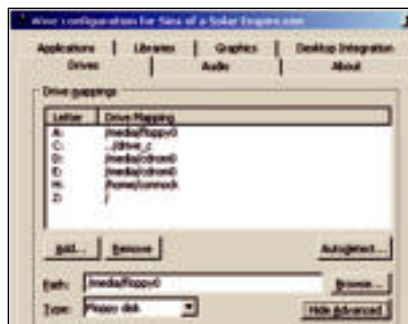
1 Installing new software for Linux has become much easier since the advent of package management software. If you're using a modern Linux distribution, you've probably utilized some kind of package manager. The most common are Synaptic/Aptitude (used by Debian and Ubuntu), Portage (Gentoo), and RPM (RedHat).

A software package comes bundled with the necessary software dependencies required by the application. Since these dependencies often overlap between applications, a package manager will ensure that your system installs only the dependencies that are missing. If you already have what you need, the package manager links the dependencies that have previously been installed to the new application.

Installing Wine on a package-managed system is as easy as telling the package manager to go ahead and install the program. One quick preface: All of our instructions are based on our experience with Ubuntu. Your Linux variety may vary, but the overall gist of our instructions should remain the same.

To get Wine onto your system, first launch the Synaptic Package Manager by opening the Applications menu on the title bar at the top of your screen and clicking Add/Remove. Click the Binocular icon and type `wine`, but be sure to select the "Show All Available Applications" option before you commence your search. As you can see in the above screenshot, your results will include an application called Wine, version 1.0.0.

Finish the job by clicking on the box to the left of Wine to select it and then click the green check mark labeled Apply. Confirm the installation of any additional packages to ensure that your installation doesn't choke when it fails to find its dependencies.



CONFIGURE WINE'S GRAPHICS AND AUDIO

2 Open a terminal window in Ubuntu and type `winecfg` to launch Wine's configuration screen. Start by clicking the Drives tab and set Wine to autodetect your drives, as shown in the upper image. The application will create a file structure that mimics Windows: It will establish your base directory as a C:\ drive and map your optical drive to D:\.

Next, click the Graphics tab to adjust your DirectX settings. We recommend using the settings displayed in the lower image: Check only the second and fourth options under Window Settings. The last option is especially critical, as it'll make your Wine games stay windowed. That way, if your game crashes, you'll still have access to your Linux desktop. Don't forget to set your gaming resolution: You'll do that underneath the Emulate a Virtual Desktop option.

Finally, click the Audio tab and then click the Test Sound button. If you can't hear anything coming from your speakers by default, select each of the provided drivers—one at a time—until you have sound. It's a crude solution, but it will take the least amount of time to get your speakers rockin'.



CHECK GAME COMPATIBILITY

3 Before you rush to your local game store and spend the hard-earned money you saved by using a free operating system instead of Windows, read this step. It's mission critical.

Linux comes in many varieties. Because of this, certain games tend to run better on certain distributions. And more often than not, specific titles will flat-out not work with the specific distribution—or any distribution—you're running.

You should know a title's compatibility issues before you plunk down \$50 for a game. For that, you can turn to Wine's official application database at appdb.winehq.org. This giant user-driven database provides ratings of and recommendations for running more than 10,000 applications and games in Wine.

The games and applications are broken

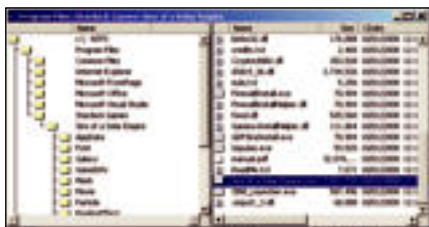
QUICK TIP

The most compatible Wine app, as reflected by ratings and voting, is Valve's Steam application. But that doesn't mean its games are 100 percent compatible with your Linux distro: Check a game's individual ranking for that.

down into specific test results, which the site presents based on combinations of tested distributions and Wine versions. Each listed entry tells you whether the program was able to either run or install correctly and assigns an

overall usability rating to the experience.

Even if your game of choice appears to be broken on all Linux varieties, be sure to read the user comments appended at the bottom of each game's results page. You might discover information about a new workaround or patch that has yet to be reflected in the game's overall ratings.



INSTALL YOUR GAME

4 The installation process for applications under Wine is generally the same as it is in Windows because Wine uses the same installer. We're going to focus on installing our game of choice, Sins of a Solar Empire, but you can use the same process to install a variety of other titles. Start by opening a Linux terminal and typing `winefile`. This pulls up the application's Windows Explorer-like interface.

Navigate to your optical device by clicking the appropriate icon at the top of the window—it should look like a CD going into a drive. From there, double-click your game's installation file (setup.exe, for example) and let the installer do its thing.

Follow the instructions as you would for any game being installed in Windows but pay attention to any errors or glitches that you see. Chances are good that you'll notice fonts sizes are off and, in some cases, the fonts won't display at all. We'll come back to that later.

Once you've installed the game, you'll want to make it easy to launch. You can do this by finding the executable file and linking it to a launcher—the Linux version of a Windows shortcut. By default, Wine hides its fake Windows partition in your `/home/[user name]` directory. So you'll want to right-click your Linux desktop and select the Launcher creation option. Name the Launcher whatever you want, but start the command as follows: `wine "/home/[user name]/.wine/drive_c/"`. After the "drive_c" section, type out the path where you installed your program.

If you can't get a launcher to work, don't worry. Some games end up working only by double-clicking the executable within the Winefile application.



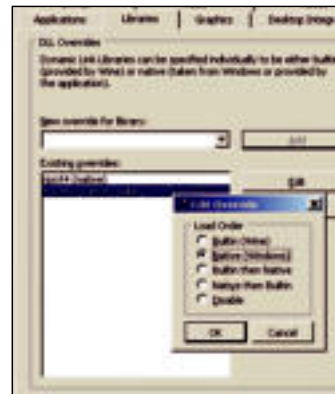
TROUBLESHOOTING

5 Although we've been able to install and run Microsoft Office, Guild Wars, and NHL 08 without any problems, Sins of a Solar Empire was trickier. This gives us a perfect transition to Wine's biggest headache: troubleshooting.

In our case, the fonts for our game were the wrong size and, in some cases, completely nonexistent (see above). If this happens to you, there's a quick workaround. From a Windows installation, copy the fonts out of the `C:\Windows\Fonts` folder. You'll then want to launch Winefile and copy the fonts back into Wine's simulated Windows installation, same `C:\Windows\Fonts` folder.

If your chosen application gives you compatibility problems, it's time to return to the Winecfg configuration tool. If the application was developed for a specific instance of Windows, try using the Applications tab to force Wine to use a suitable compatibility layer for the program. Click Add Application, choose your executable file, and choose the appropriate version of Windows.

The configuration tool also lets you change graphics and audio options as mentioned earlier. Disabling hardware support can keep games from crashing but sacrifices game performance in doing so. When in doubt, turn settings to minimum and bring them up slowly as you attempt to troubleshoot the best configuration for your game.



WORK IN THE WINE LIBRARY

6 When you are configuring a new application, it's wise to launch it from a terminal until you have the kinks ironed out. Doing so allows you to read the error messages that stream down the screen as the application runs. Bear in mind that many of these messages are not errors; they are used by developers to tune Wine. This makes them useful sources of information, particularly when they spit out .dll (dynamically linked library) errors.

A dynamically linked library is a fancy term from Microsoft that refers to a library of software used by various applications. These libraries are "linked" to applications as they are needed. If this reminds you of the package-managed dependencies mentioned at the beginning of the article, hand yourself a gold star. These libraries are what Wine replaces when it runs your MS-based applications.

Sometimes, the libraries are missing or incomplete. In this case, the .dll errors mentioned earlier will give you the name of the specific files that are causing problems. Replacement .dll files can be found in your Windows install or in a regular Windows install of your application. To fix errors, you can use the Library tab in Wine's configuration tool to replace Wine's .dll with the authentic .dll. ☺

ALTERNATE APPROACH

Wine vs. Cedega

Not everyone has the time or patience to wrangle Wine into submission, and TransGaming Technologies (www.transgaming.com) is hoping to bank on this fact. The company has produced a "commercial re-implementation of the Windows API for Linux with a focus on gaming." Sound like Wine? It should. Transgaming's product, Cedega, is based in part on the free Wine source code. Many in the open-source community view this as an outrage, but Transgaming insists it violates no licenses. For a small fee, it offers "Wine that works" with a list of games guaranteed to run with it.

This month the Doctor tackles...

► Power Supply Failures

► Digital Audio

► Overclocking



Can't Hear Jack

I finally took the plunge and built my own rig. Everything worked fine until I plugged my Boston Acoustic Digital BA735 speakers into my EVGA 680i motherboard's onboard outputs: Nothing happened. I received no sound at all. I tried the same speakers with a Creative Sound Blaster X-Fi XtremeGamer card and got the same result: zilch. Am I missing something here?

—Rich M.

The BA735s can't be used as digital speakers—at least not with your hardware. The Sound Blaster X-Fi XtremeGamer supports optical out, not coaxial digital audio. And your EVGA 680i also supports only optical SPDIF out. The Doctor believes that the BA735 speakers support only coax SPDIF in for its digital mode. You can't run optical digital-out to a coaxial input.

Fortunately, the speakers have an analog port. You should buy a standard 1/8-inch cable and connect the analog-in port on your speakers to the green audio-out of your soundcard or motherboard.

A Two-PSU Kind of Day

My Tagan TG900-U96 Turbojet 900-watt PSU recently burned out. I returned it, but it was no longer being supported through the third-party vendor I got it from. The vendor sent me

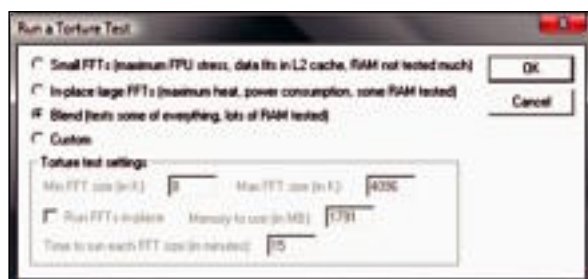
an Apevia Warlock 900-watt PSU to replace my Tagan. I swapped it out, but now when I turn on the computer it won't boot all the way. I get power lights, and the keyboard and mouse light up, but the monitor never kicks on, nor do the other connected peripherals (external Zip drive, printer, and scanner).

What could be going wrong with my computer? I never had this happen with the Tagan. Could something have been corrupted when the original PSU died?

—Ben Locke

First, you should have contacted Tagan. The company offers a three-year warranty on its PSUs. There is certainly a chance that the components were damaged when the first PSU blew up—especially if it blew up due to, say, a lightning strike. But before you go any further with your new power supply, go back into the case and make sure everything is firmly inserted—you'll want to make sure there are absolutely no loose connections.

You'll also want to make sure nothing is shorting out in the case. The Doctor will assume that you are using motherboard standoffs in all the appropriate places—simply screwing your motherboard to the case itself would



The Doctor often runs Prime95 instances to test his machine during overclocking. If his rig can run reliably during this torture test, he's found a stable speed.

be one cause of a short.

If you've done these steps and you're still having boot problems, try using another PSU from a friend to see if your new power supply is at fault. The Doctor has seen many startup issues caused by the power-good signal timing that some boards require. Finally, don't rule out the possibility that your new power supply is bunk. It does happen.

Stock Cooler Safety

How far can I safely overclock a CPU if I'm using a stock cooler? I was building a budget rig and when I had money left over, I decided to upgrade from a high-end Athlon 64 to a really low-end 2.2GHz Phenom. I want to up the performance, even by a tiny bit, but I'm hesitant to do it with a stock cooler. Please help!

—Andy Shores

There's no clear-cut way to determine how much performance you'll be able to squeeze out of your processor. It depends on a number of factors, including your motherboard's ability to overclock, the reliability of your power supply, and the prowess of your cooler.

The Doctor has found that AMD CPUs tend to be more difficult to overclock than Intel CPUs in terms of how far you can push the processor's speed. That said, you're not going to destroy your machine simply because you're using a stock cooler—not as long as you follow a conservative approach to your overclocking: Start by slowly cranking down your HyperTransport speed and ratcheting up your CPU frequency.

After each modification, you'll want to test the stability of your machine. At first, just reset your computer and see if it boots into



SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

Windows. As you up the CPU frequency higher and higher, you'll eventually hit a point where your computer will cease functioning. Note this value, reset your motherboard's CMOS, and dial the CPU frequency to a few steps below the terminal point. Boot into your operating system and launch Prime95 (www.mersenne.org), our stress-testing application of choice. Run an instance of the app's torture test for every CPU core you have—if your rig survives, you've reached a steady overclock.

A Bandwidth Battle

I built my computer about a month ago—it's nothing special. I'm running an Intel Pentium D 820 on an Asus P5W DH Deluxe motherboard. For a videocard, I'm rocking a BFG 9800 GTX.

I stumbled upon the System Information at the bottom-left corner of the Nvidia Control Panel recently. When I clicked it, I took note of the plethora of information on the 9800 GTX. What caught my eye was the very last line: BUS: PCI Express x4. That seems off, given that my card uses an x16 interface. What gives?

—Juan Campos

You neglected to insert a key piece of information that would help the Doctor easily diagnose your problem. Are you using the top orange PCI Express slot or the bottom black slot? If it's the latter, the Doctor has frequently found that this slot will be physically x16-compatible, but it will actually run at a lower setting. Still, it's strange that your System Information panel is reporting this as an x4 slot: That's lower than the Doc would expect, even if you were using the incorrect slot.

Try reseating your 9800 GTX into your motherboard's orange PCI Express slot. If

the problem still isn't corrected—or if your card has been in this slot all along—you'll want to triple-check that you've firmly inserted the card into the PCI Express connector. If you're still receiving the same x4 information after that, update your motherboard's BIOS. It's possible that some form of communication error between the mobo and Nvidia's application is causing the confusion.

Windex Worries

A couple weeks ago I received a Dell Inspiron 6400 from a friend of mine. I was told that he used Windex directly on the screen, which dripped into the bottom of the LCD (between the screen and the housing). It now has a small, permanent "white fire" pattern on the bottom-center of the LCD screen. It appears not to be a physical effect, as I cannot see it when the laptop is off, but I can see it even when the backlight is turned off.

What should I do to fix my display?

—Jason Wesley



This is a glimpse of what can occur should you blast your LCD screen with Windex.

The Doctor has some bad news for you: Your situation is terminal. In this case, your laptop will require a screen transplant, as the Windex has irreversibly damaged the underlying layer of your panel. Even if you use Windex to clean a laptop's screen—and the Doctor doesn't recommend you do this—you need to resist the urge to spray it willy-nilly over the entire surface.

Instead, spray a little bit on a

cloth and use that to buff out your screen's blemishes.

Ultimately, your screen will fare far better if you spritz a microfiber cloth with an alcohol-based LCD cleaner and give your screen a rub. You can make your own using a 50-50 mix of 70 percent isopropyl alcohol and distilled water. Or, if you're feeling lazy, you can pick up a premixed screen cleaner from your computer store of choice. ☺

SECOND OPINION

Missing Voices in Crysis?

I have run across the same issue experienced by Tom Gonzales regarding the missing voices in Crysis (September 2008), except I had the problem with FEAR. The culprit was actually the modified l3codeca.acm file I was using for converting DVDs to DivX. The OEM l3codeca.acm file provided with Windows allows MP3 encoding only at very low bit rates. The modified l3codeca.acm gave access to a full range of bitrates, but when used, would not play any of the voices in FEAR. The implication is that FEAR uses l3codeca.acm to decode and play back the voices, whereas other games must use some other playback engine.

The file resides in the %systemroot%\system32 folder. The band-aid fix is to simply use both l3codeca.acm files and rename them as necessary depending on whether you're playing FEAR or compressing DVDs. I don't know if this will resolve Tom Gonzales's issue as I don't have a copy of Crysis to test with, but it's certainly worth a shot. —DAVE MACK

REVIEWS

Tested. Reviewed. Verdictized

INSIDE

- 80 ASUS MAXIMUS II FORMULA MOBO
- 82 DIGITAL STORM BENCHMARK CRUSHER →
- 85 COOLER MASTER HAF CASE
- 86 SIMpletech REDRIVE
- 87 PLANON PRINTSTIK PS910
- 88 THERMALRIGHT IFX-14 COOLER
- 89 SID MEIER'S CIVILIZATION IV:
COLONIZATION
- 90 LAB NOTES

ONLINE

- TS-209 PRO II NAS BOX
- VOX BLACKBOX EXTERNAL HARD DRIVE
- DLINK NAS BOX
- RAIDMAX ICEBERG CASE
- BUFFALO LINKSTATION MINI NAS
- THINK ESSENTIALS Z-WAVE CONTROL SYSTEM
- LINKSYS WRT310N WIRELESS ROUTER
- ZEEVEE TV STREAMER
- DAS KEYBOARD

PLUS Best of the Best,
Editors' Blogs, and the
No BS Podcast



Asus Maximus II Formula

Nerds, start your engines!

It's official: People who buy motherboards with mainstream chipsets such as the P45 don't want to pay for DDR3. At least, that's what it seems like to us. Asus's impressive Maximus II Formula is the third P45-based board we've tested, and not one of them sports DDR3 slots. But that doesn't take anything away from the MIIF, the coolest P45 board we've encountered.

With its subdued heatsink, motherboard-based X-Fi support, and oversized

start and reset buttons, the Maximus II Formula sports some slick features. It performs quite ably too. MSI's more garish P45 Platinum outpaces the MIIF by a small margin in some benchmarks, but the MIIF led the MSI and a Gigabyte P45 board in RAM speeds. So, we'll call it a wash.

In hardware features, it's close, but we give the edge to the MIIF, with its eight SATA ports and superior audio. We also prefer its ADI-based codecs and drivers over Realtek's. We've been worried about ADI software support since the company quit the PC audio business, but a spokesperson told us that ADI is not quitting on driver support (let's hope). Plus, there's the MIIF's X-Fi support, which produces more satisfying gaming audio than Realtek's solution—despite the absence of promised EAX4 support. Creative-licensed X-Fi drivers supposedly enable EAX4 on boards that don't even use Creative hardware. That's cool, but we couldn't get the EAX4 support to work, and even the tools Creative gave us said the feature wasn't working.

Creative officials insist that it's there, but it's not, at least not with the drivers

The audio CODECs are on a breakout card to help ease electrical noise.

ASUS MAXIMUS II FORMULA

VERDICT **9**

+ FRESCA

Tons of SATA ports, some X-Fi support, an eye-pleasing color scheme.

- DIET DR. PEPPER

Pricey; we couldn't enable the EAX4 modes.

\$270, www.asus.com

BENCHMARKS

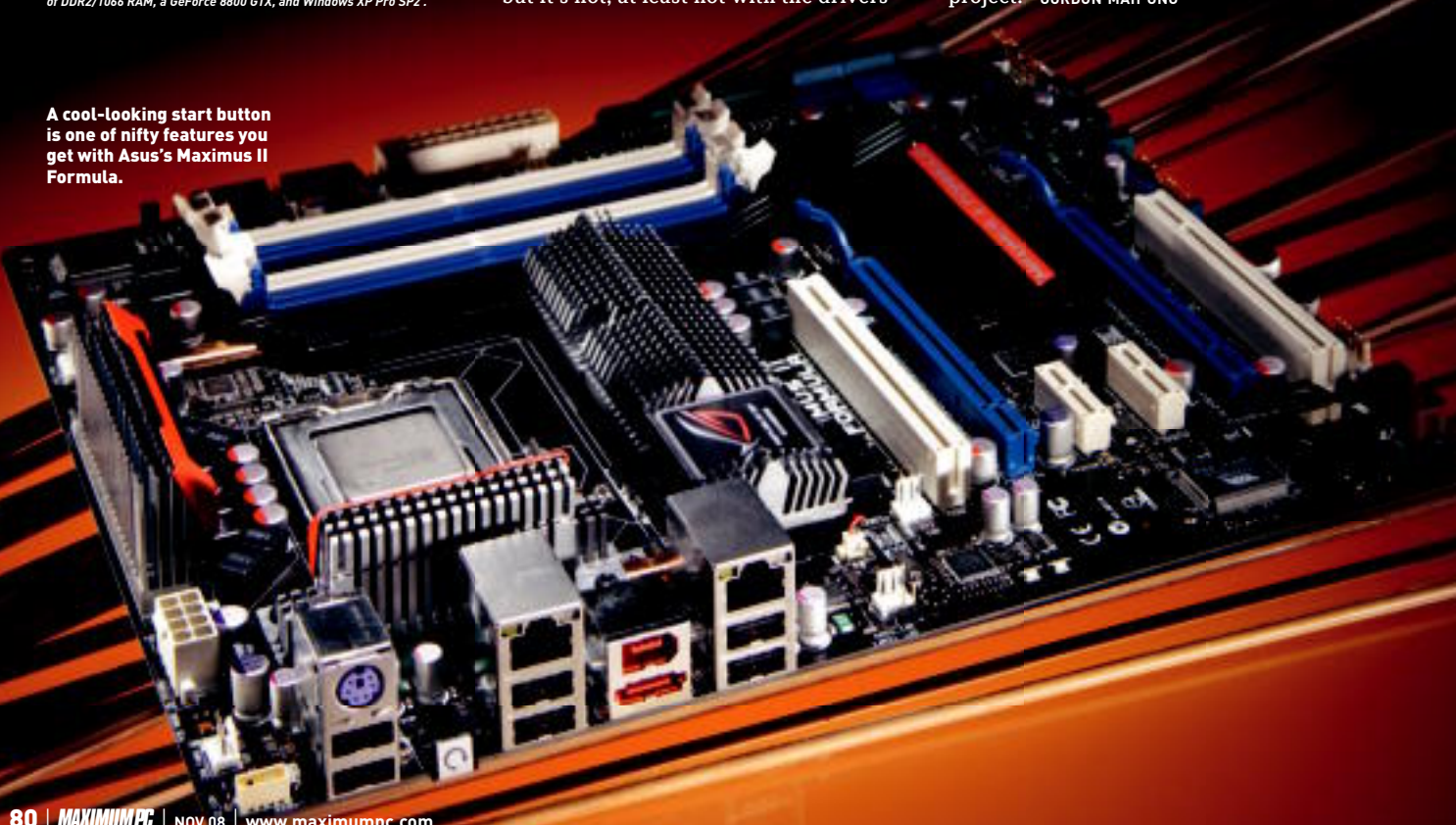
	Asus Maximus II Formula	MSI P45 Platinum
PCMark06 Overall	8,315	8,756
PCMark06 RAM	5,826	5,737
3DMark06 Overall	12,442	12,735
ScienceMark 2.0 Overall	4,162	4,129
ScienceMark 2.0 Mem	7,048	7,112
Valve Particle test	85	88
UT3 (fps)	117	117
FEAR (fps)	215	245
Quake 4 (fps)	184.0	177

Best scores are bolded. Our test bed consists of a Core 2 Quad Q9300, 2GB of DDR2/1066 RAM, a GeForce 8800 GTX, and Windows XP Pro SP2.

A cool-looking start button is one of nifty features you get with Asus's Maximus II Formula.

that come out of the box or the ones on Asus's website. If Creative and Asus are true to their word, the feature will eventually pop up, making the audio experience even better.

There's a catch to all this goodness: The MIIF has a \$260 street price, while the equally fast MSI P45 Platinum is about \$75 less. But that extra \$75 does get you a lot, including an English-language POST LCD box, X-Fi EAX4 support (hopefully), and more SATA ports. It also gets you a heat-sink that doesn't look like a bad art-school project. —GORDON MAH UNG



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VERDICT

9

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Cooler Master HAF

The new case to beat for air-cooling aficionados

Cooler Master's newest HAF (High Air Flow) chassis is the company's magnum opus. It successfully unifies the best bits and pieces from a wide variety of Cooler Master's previous cases under one roof. But more than that, the HAF features a number of unique and helpful additions that truly raise the bar for case design.

The most noticeable of these improvements is the HAF's centerpiece: case cooling. A total of three 23cm fans are screwed into the top, front, and side of the HAF, which allows the fans to circulate air even when they're running at just 700rpm. This solution balances increased air flow with acceptable noise levels. But you can always remove the case's top and side-panel fans to add smaller, higher-powered varieties if you so choose.

The 22.7"x9"x21.5" HAF allows for a number of customization options: There's plenty of room for an ATX or EATX motherboard, six 5.25-inch devices, five hard drives, and two power supplies (or one power supply and a two- or three-bay internal water-cooling radiator). It's rare to see a case offer this many options.

Much of the HAF's success can be traced to the inclusion of features that are in other Cooler Master cases. The 5.25-inch bays feature the same push-button locking mechanisms used in the company's Cosmos line of cases, and the tool-free PCI retention tabs are identical to those found in Cooler Master's 690 chassis. However, the plastic hard-drive holders are an upgrade over the 690's flimsy mounting racks.

The case weaves these great elements together alongside new improvements. Our favorite is the large hole in the motherboard tray that lets you add or remove CPU backplanes without having to disassemble the entire machine. The HAF also comes with a hole on top of the case for filling water-cooling reservoirs. Cooler Master covers this area with a piece of rubber, allowing it to double as a handy slip-proof storage area. It's just one more example of great detail work.

The industrial look of Cooler Master's HAF is accentuated by a single red LED fan. Lighting enthusiasts take note: It doesn't add a lot of glow to the middle of the case.

We do have a few criticisms: We'd love to be able to control the fans' speeds with a built-in hardware controller instead of our BIOS, and reactions on the aesthetics of the case were mixed—some editors hated the combination grill and window side panel, some loved it. Overall, the case uses only its front fan for LED lighting. One more lighting source would help improve the HAF's inner aesthetics.

Regardless, Cooler Master's new chassis is definitely not full of hot air. —DAVE MURPHY



COOLER MASTER HAF

VERDICT **9**

+ TMZ

Top-notch (and quiet) cooling, motherboard backplane hole, totally tool-free.

- TNT

Lacks a fan controller; could use a bit more LED lighting on the inside.

\$160, www.coolermaster.com

SimpleTech Redrive

What's next, hard drives made from twigs?

In some alternate world, Fabrik's SimpleTech Redrive is winning a Kick Ass award from *Green PC*—*Maximum PC*'s eco-conscious sister publication. This is the most environmentally friendly external storage device we've ever tested. From its packaging, to its construction, to its guts, the Redrive is designed with a single purpose in mind: saving the planet. As a byproduct of this, the drive saves you energy and, consequently, money.

Saving energy generally doesn't lead to superior speeds in the storage world. And it wouldn't with the Redrive either if the drive had connection options other than USB. Over an eSATA connection, for example, its internal 500GB Western Digital Caviar Green drive would perform far more slowly than a majority of the external devices we've tested. This is because the Caviar Green drive modulates between 5,400rpm and 7,200rpm, sacrificing

performance for energy savings when compared to the standard 7,200rpm hard drives used by most external storage products.

Since the Redrive is constrained to the pipeline of a USB connection, the Caviar Green's overall speed is of less relevance. In fact, the Redrive ends up beating every other USB external device we've tested in our synthetic benchmarks. The catch is that you won't notice any real-world difference, given that it beats the speeds of similar USB external drives by less than five percent.

However, the Redrive also comes bundled with the same TurboUSB technology that's included with Buffalo's external storage offerings. This proprietary application allows the drive to shoot past the traditional 37MB/s speed cap we've experienced with all other external USB drives.

Unlike Buffalo's DriveStation Combo 4, the Redrive has a slight issue with its Tur-

The Redrive's shell is constructed of bamboo and recycled aluminum. The latter doubles as a handy heatsink for the hard drive itself.

boUSB functionality. The software pushes the Redrive's average write speeds 20 percent faster than normal, and faster than any USB-based drive we've tested, but it fails to increase the drive's read speeds. This isn't the case with the DriveStation Combo 4, which enjoys speed increases of approximately 20 percent on both its reads and writes when compared to standard USB speeds. The consequence of this is that the DriveStation Combo 4 edges out the Redrive in our real-world benchmark, PCMark05, by 2 percent.

A simple scheduled-backup application rounds out the Redrive's feature set. While the discrepancies between the device's TurboUSB read and write speeds are a slight ding, there is nothing else about the Redrive that makes us sour. In this case, green is golden. —DAVE MURPHY

BENCHMARKS

	Redrive (USB)	Redrive (TurboUSB)	DriveStation Combo4 (USB)	DriveStation Combo4 (TurboUSB)
HD Tach Burst (MB/s)	35.1	40.6	36.2	WNR
HD Tach Rdm. Access (ms)	14.8	14.9	16.4	16.4
HD Tach Avg. Read (MB/s)	34.9	34.9	33.9	41.7
HD Tach Avg. Write (MB/s)	34.9	43.8	34.2	41.1
PCMark05 Overall	3,468	3,757	3,698	3,833

Best scores are bolded. HD Tach version 3.0.1.0 used.

VERDICT

8

SIMPLETECH REDRIVE

✚ POLAR BEAR

Saves energy; speedy TurboUSB performance.

✚ FLYING SQUIRREL

Only write speeds are improved by TurboUSB.

\$150, www.simpletech.com

Planon PrintStik PS910

For emergency use only

We thought thermal paper was dead and buried along with mimeograph paper, but look out, it's back!

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with generic thermal paper, but Planon has you there: The rolls are integrated into a cartridge, so you're stuck buying from the company. Thanks, Planon.

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duction in an expensive, albeit tiny, printer. To us, that's just not a winning proposition. We do acknowledge that it has some utility for an extremely small set of users. For those people, it certainly is better than writing something out longhand, but for the rest of us, it might be better to just break out the Ticonderoga No. 2. —GORDON MAH UNG

		VERDICT	
PLANON PRINTSTIK PS910			
 TINY BONHAM	 TINY TIM		
Small; useful in dire printing emergencies.	Expensive refills, pathetic graphics output, pricey.		
\$300, www.planon.com			

The PrintStik is like a teleportation device back to the 1980s.



Thermalright IFX-14

This skyscraper includes a time-consuming installation

Installing Thermalright's beefy IFX-14 CPU cooler is incredibly complex.

Assembling the troublesome amalgam of parts, pieces, screws, and brackets made us long for the snap-lock mechanism of standard Intel coolers. That said, the IFX-14 delivers massive cooling when it's up and running. But there's a caveat: It doesn't include any fans. Thus, its performance depends on the type of fan you attach to one or two sides of the device. Our benchmarks are based on the use of two generic 12cm fans we pulled from a box in the Lab.

Even getting two fans to work with the IFX-14 can be troublesome. This cooler's immense size—two towers of heatsink fins connected to four 0.8cm heat pipes—caused the device to push right against our RAM, making it difficult to attach the fan-mounting clips. The IFX-14 also nudged up against the north bridge on our EVGA 680i motherboard. This forced us to rest a southern cooling fan in the split between the cooler's heat pipes. It's hardly an ideal location, as we were unable to secure the fan to either of the cooler's fins.

The IFX-14's cooling performance is better than our champion's, Thermalright's DuOrb, by a few degrees in both our idle and burn tests. But the cooler's usability issues make us long to trade in these

degrees for a more painless installation process—or one that doesn't constrain our case options. For example, if you incorporate the IFX-14's optional back-side heat-pipe cooler into your installation, you won't be able to use a top-mounted power supply. There's simply not enough room. Likewise, we made the mistake of screwing the cooler into place before testing how its size would affect our motherboard installation. The cooler blocked two standoff screws and taxed our ability to connect power supply cables.

Bigger is often better in the world of CPU cooling, but the IFX-14 pushes the limit too far. —DAVID MURPHY

BENCHMARKS

	IFX-14 (no fans)	IFX-14 (two fans)	Thermalright DuOrb	Stock Cooler
Idle (C)	51.3	29.8	31.0	41.8
100% Burn (C)	96.0	44.0	49.5	69.3

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard.

VERDICT

8

THERMALRIGHT IFX-14

COLOSSUS

Wonderful cooling performance; unique rear cooler for the motherboard.

THE BLOB

Gigantic, difficult to install, no fans included.

\$80, www.thermalright.com

You'll want to plan out the cooler's (and your motherboard's) installation before you actually attach the IFX-14, as it can block a good chunk of your motherboard's cabling routes and standoff holes.

Sid Meier's Civilization IV: Colonization

It's the economy, stupid

In contrast to the broad scope of past Civilization games, this beautiful remake of 1994's Sid Meier's Colonization focuses on a specific period of time in a specific part of the globe—namely the Colonial era (1492-1796) in the New World. As the leader of a European nation's colonization effort, you must battle other European countries and Native Americans for control of the continent's resources, build a trade empire, and eventually wage a war of independence against your home country to found a new nation.

The anemic combat and diplomacy systems are secondary to the economic game, in which you harvest resources such as cotton and tobacco, refine them into trade goods, and sell them to fund your expansion. Early in the game the challenge comes from micromanaging specialist colonists to efficiently produce goods; this task would become a nightmare as your trade empire expands if not for the excellent automation tools, which make the whole operation a breeze.

Combat presents a problem in that dragoons seem to win nine out of 10 battles, regardless of how many heavy fortifications you lay down. This isn't so bad in the early game, but when you tire of your European overlord's insatiable demands for tax hikes and tribute and declare your independence, defending your colonies from the massive onslaught of troops and warships becomes an extreme challenge.

There's a ton of replay potential here, with four playable European nations and eight leaders, each with unique bonuses that can dramatically affect strategy, combined with a random map generator. Colonization doesn't have much in common with the Civ games, but it definitely evokes a "just one more turn!" feeling that keeps us playing into the dawn's early light. —DAN STAPLETON



The ridiculous number of European troops you face during your war of independence makes you appreciate the efforts of our founding fathers all the more.

		VERDICT 8
SID MEIER'S CIVILIZATION IV: COLONIZATION		
 GEORGE WASHINGTON	 GEORGE III	
Highly addictive gameplay, lush graphics, good automation features.	Unbalanced combat, unforgiving end-game.	
\$40, www.civilization.com , ESRB: E 10+		

LAB NOTES

Should You Defragment Your SSD?

There's a good reason you should steer clear of this common practice

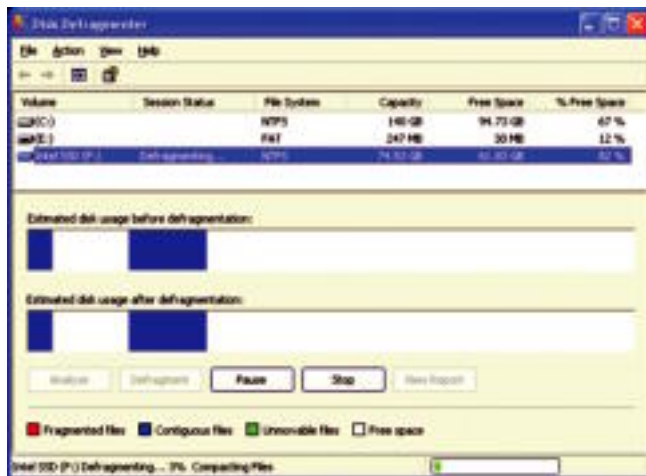
Defragmenting a hard disk has a tangible effect: It reorganizes the data that's been scattered all around the drive into contiguous chains. This, in theory, mitigates the mechanical delays that occur when the drive's actuator arm has to jump around and wait for a specific portion of the platter to rotate underneath the drive heads.

A solid-state drive has no perceptible delays in its reads, regardless of whether the data is arrayed in contiguous flash cells or spread out across the drive. There aren't any moving parts, after all. So there's really no reason to defragment an SSD.

Worse, massive defragmentation operations on the drive could dramatically lower an SSD's life expectancy. The more you rearrange your data across different flash cells, the more finite write cycles you're using. SSDs can last a long time, but there's no need to test the waters unnecessarily. We've talked to SSD manufacturers and they agree—there's really no reason to defragment an SSD.

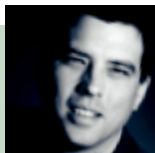


DAVID MURPHY
ASSOCIATE EDITOR



WILL SMITH
EDITOR-IN-CHIEF

This month, I tested a ton of videocard (see the reviews online) and also spent some quality time with keyboards and mice (also online). While I'm going to stick with my trusty Natural Ergonomic Keyboard 4000, I'm tempted by some of these new gaming mice. They might even convince me to ditch my G5!



TOM EDWARDS
MANAGING EDITOR

This month's cover feature motivated me to get organized. I began by figuring out where my paycheck goes each month by enrolling in Mint and then I started a training log at Map My Run. You can see my runs at <http://tinyurl.com/5c3xbn>—I'll keep the finances to myself though.



KATHERINE STEVENSON
DEPUTY EDITOR

Despite our recent critique of *Battlestar Galactica*, the show has proven to be a source of bonding for the staff. As those of us without cable or satellite TV service (yes, such freaks of nature do exist!) catch up on the BG DVDs, we've had some epic group discussions about the show.



GORDON MAH UNG
SENIOR EDITOR

Adobe's new CS4 suite makes some big promises, so I'm checking out betas of the product to get a head start on new benchmarks. Hopefully, the GPU functionality will be supported so we can push both the CPU and GPU in our new suite of tests.



NORMAN CHAN
ONLINE EDITOR

Nehalem and Intel SSD drives weren't the only big products to come out of this year's Intel Developer Forum. I also got to take an early look at USB 3.0 hardware, quad-core extreme-powered laptops, and a prototype tablet-notebook hybrid that runs Microsoft's Origami interface.

Win ▼

Rig of the Month

**IF YOUR MODDED PC IS CHOSEN
AS A RIG OF THE MONTH, IT WILL:**

- ▶ **1** Be featured before all the world in *Maximum PC*
- 2** Win you a \$250 gift certificate

SO WHAT'S STOPPING YOU?

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to rig@maximumpc.com. Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) the contest ends, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries and featured in the Rig of the Month department of the magazine. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

Planon PrintStik PS910

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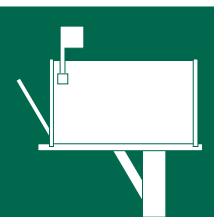


We tackle tough reader questions on...

► Dream Machine 2008

► Best PSU?

► Home Automation



Sounding off about Dream Machine

I've been a reader since the dawn of *Maximum PC* and have always waited anxiously for the Dream Machine issues. I have one bone to pick that has been brewing for some time: Why do you pick a "gaming" soundcard (i.e., a Sound Blaster) every single year? Since computers are now considered the best media boxes, why wouldn't you pick a soundcard armored with a huge arsenal of chips and components that hook to a home entertainment system for media enthusiasts? No gaming card is equipped for superior Blu-ray playback on a blockbuster surround system. Last time I checked, this wasn't "Dream Machine Gaming Series '08." Maybe next time you guys could go with two soundcards to satisfy both genres of nerdery?

—Tannar Frampton

Senior Editor Gordon Mah

Ung Responds: It's true that Creative's cards have been featured prominently in Dream Machine over the years because of their strength in gaming—Creative is the only soundcard vendor directly supporting games, and in many titles, you need

an X-Fi to turn on the high-end features. Fortunately, these days, there's really no reason to buy a second card for other media chores. Creative's X-Fi Titanium supports optical SPDIF out, which lets the card pump out Dolby TrueHD audio. The card also now supports real-time Dolby Digital Live encoding of game audio, so you can even play your games on your big-screen TV.

SSD Is MIA

How can the best PC ever not have a single SSD ("Dream Machine" September 2008)? Yes, they are expensive. But so is \$6,000 for a paint job and funky case. A \$17,285 PC should have at least one SSD.

—Stephen Cargill

Associate Editor Dave

Murphy Responds: Our reasons for not including a solid-state drive in Dream Machine 2008 are simple: These drives offer low capacities for their price, and their write speeds are inadequate for a machine of the DM08's caliber. These are the greatest hindrances of modern-day SSD technology, as we've detailed in this month's SSD feature on page 40. We'd much prefer Velociraptors in a RAID 0 array at this point in the storage game.

with this year's Dream Machine. One question, though: With the reservoir mounted sideways in the case, how do you refill it?

—Terry

Associate Editor David

Murphy Responds: Actually, that's the tricky part. Refilling or topping off the reservoir's fluid levels—which we would

expect to do once every three to five months—requires us to remove the water blocks from the CPUs and pull the whole enchilada out of the case. It's just that tight of a water-cooling loop. And since we've mounted the reservoir sideways, there's no way we could fill it up, or even open the fill hole, were it to remain in the case.

■ ■ ■ NOW ONLINE

Repartition Your Hard Drive on the Fly— for Free!

This month, in the How To section of *MaximumPC.com*, we'll tell you how to repartition your computer's hard drive without the hassle of formatting and nuking, using a killer free tool called Parted Magic. Check it out at <http://tinyurl.com/6oxvst>.



CUTCOPYPASTE

The Gateway P-7811 system reviewed in the October issue does not include Bluetooth or a fingerprint reader.



Keeping the Dream Machine Cool

Just got my copy of the September issue, and I have to say I'm very impressed

Cable Confusion

I am in the process of rearranging my desk and decided that since I was going to disconnect everything anyway, I'd give your cable organization ideas a shot. That's when I noticed that there's contradictory information in two of your articles. In "Organize Your Computer Cables" (Special Winter 2008), Step 4 states, "Be sure to combine like-minded cables as much as possible... The same holds

possible, but if you absolutely must cross them, make sure the crossings are perpendicular. Sorry for the error. We'll have the person responsible for the error flogged. P.S. It's Norman.

Power Shortage

I could not find a PSU recommendation on your Best of the Best webpage (www.maximumpc.com/best-of-the-best) and would love to see the category added or an explanation of why a PSU is not listed. I would

Making a Case for Control4

I was surprised not to see any Control4-branded products listed in "The Digital Domicile" (June 2008). Although you need to go through a dealer to purchase their products, just one home controller can control a home theater, distributed audio, IP cameras, and the company's Zigbee lighting products. Granted, the interface could use some work and the system lacks customization, but you can't beat the price for a fully integrated home automation solution, and setup is a breeze. With the last update, Control4 added Rhapsody music service downloads through the onscreen interface, which although is super cool, couldn't they have picked a better music service?

—Patrick Clemins

Editor at Large Michael

Brown Responds: Thanks for the feedback. I was interested in discussing Control4's products, and I met with company representatives briefly at CES, but they weren't interested in having their products covered in a consumer/DIY magazine. They're focused exclusively on the custom-installer market, which is not part of *Maximum PC's* focus.

As for Rhapsody, I've been a subscriber for years and I absolutely love using the service with the Sonos music system. Using Rhapsody on a PC, on the other hand, is beyond aggravating. ☹

rather get a recommendation from *Maximum PC* instead of another website or magazine because you have never steered me wrong. Thanks for the help and keep up the great work.

—Daniel Whatley

Senior Editor Gordon Mah

Ung Responds: We don't include PSUs in our Best of the Best list because we don't regularly review them. However, we can provide some advice, so you can make an informed choice. In shopping for a PSU, I would recommend you look for a single-rail design. Weight and warranty are also important. The heavier the PSU, the better (generally). And the longer the warranty, the greater the likelihood of it being a good unit.

WE'LL HAVE THE PERSON RESPONSIBLE FOR THE ERROR FLOGGED.

true for network cables and power cords—consider them the oil and water of your wiring setup." However, in the July 2008 "Hack Your Hardware" article, the section entitled "Stealth Your Cables" states, "Start by deciding which cables to bundle together.... We recommend grouping... your power and network cables."

Unless I'm misreading the July 2008 article, these two pieces of information don't agree. So which is correct?

—Felix Dozzi

Editor in Chief Will Smith

Responds: You're absolutely right, Felix! We goofed in the July issue and should not have recommended that you bind your network and power cables together. It's best to keep those wires separate wherever



LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

COMING IN MAXIMUM PC'S STOP, DROP, AND ROLL DEC ISSUE

2009 Technology Preview

We'll lay down the nitty-gritty on Nehalem, AMD's CPU road map, next year's GPUs, and much, much more!

Fix Your Network Connection!

Are your downloads too slow? Do NAS transfers take millennia? We'll show you how to fix your network problems for maximum YouTube effectiveness!

Netbooks

C'mon, a \$500 notebook?! These new, wee, cheap, portable PCs are everywhere. Should you even care? We'll pit four of them against our benchmarks.

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CRAFTSMANSHIP

Project FiveWood

Chris Cook comes from a long line of artists and explains that “it is this great gene pool that I am abusing here.” While Chris may make light of his own skills, it’s evident from these photos that he is an able successor to his forebears.

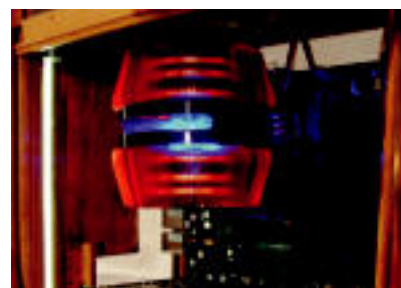
Project FiveWood utilizes nine types of wood, including mahogany, cherry, pine, and cedar. Chris’s goal was to create not a wooden shell but rather a case made entirely of wood—without a single screw! This project took more than 350 hours to complete—not including design time. We find the result well worth the effort.

BE A WINNER!

For submitting this month’s winning entry, Chris has won a \$250 gift certificate. To enter the Rig of the Month contest, see the official rules on page 92.



The 3.5-inch and 5.25-inch drive bays were constructed three times—each iteration used a different type of wood.



Although some people have questioned the rig’s thermal integrity, Chris asks, “Why would a wood case be hotter than an aluminum case? Designed properly, a wood rig would get no hotter than a standard machine.”

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